

NTPC Limited

(A Government of India Enterprise)



GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW \pm 5 MW) EPC PACKAGE

SECTION – VI

TECHNICAL SPECIFICATION

PART - A

BIDDING DOCUMENT NO.: CS-6401-001-2

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**GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW \pm 5 MW)
EPC PACKAGE**

TECHNICAL SPECIFICATION

SECTION – VI

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(PART-A)

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PART-A

VOLUME - I

INTENT OF SPECIFICATION

CLAUSE NO.	INTENT OF SPECIFICATION			
1.00.00	INTENT OF SPECIFICATION			
1.01.00	<p>Scope of the Proposal</p> <p>The scope of the proposal for Design, Engineering, Supply, Erection, Testing & Commissioning works for Great Nicobar Island Gas Power Project (108 ±5 MW) shall be on the basis of a single point responsibility, completely covering the following activities and services in respect of all the equipment specified and covered under the specifications and read in conjunction with “Scope of Supply & Services”, Volume-III, Part-A, Section –VI of Technical Specification.</p> <ul style="list-style-type: none"> i) Basic Engineering of the plant including preparation of plant design manuals for the power project. ii) Detailed design of all the equipment and system(s) including civil, structure steel works is included in bidder's scope for the Project. iii) Providing engineering drawings, equipment sizing & performance data, instruction manuals, as built drawings, O&M manuals and other information for Employer's approval. iv) Compliance with statutory requirements and obtaining clearances from statutory authorities, wherever required. v) Complete manufacturing including shop testing/type testing. vi) Complete civil, structural and Architectural works, providing construction offices, field laboratory, construction equipment, construction power and construction water; vii) Packing and transportation from the manufacturer's work to the site including customs clearance/port clearance, port charges, if any. viii) Receipt, storage, preservation and conservation of equipment at the site. ix) Fabrication, pre-assembly, if any, erection, testing and putting into satisfactory operation all the equipment including successful completion of facilities. x) Performance demonstration after successful completion of facilities. xi) Furnishing of spares on FOR (Freight on Road) site basis. xii) Reconciliation with customs authorities, in case of foreign bidders. xiii) Satisfactory conclusion of the Contract. xiv) Insurance and other requirements for the complete Power plant package in accordance with the provisions of general conditions of contract (Section-IV) of the bidding document. xv) One year supervision during operation and maintenance with deputation of 1 operation and 1 maintenance expert post successful completion of initial/trial operations & Performance guarantee tests including Demonstration tests (whichever occurs later). xvi) Execution and completion of all civil, structural, architectural, and electrical works for the Enabling Township <p>The Power plant is expected to run for its life on RLNG as fuel for the project.</p>			
1.02.00	<p>The Bidder shall be responsible for providing all material, equipment and services, specified or otherwise which are required to complete the project and fulfill the intent of ensuring operability, maintainability and reliability of the complete work covered under this specification. It is not the intent to specify completely herein, all aspects of design and construction; nevertheless, the equipment and works shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation, in a manner acceptable to Employer, who will interpret the meaning of the specification, drawings,</p>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC NO: CS-6401-001-2		Volume I Intent of Specification Page 1 of 2

CLAUSE NO.	INTENT OF SPECIFICATION	एनटीपीसी NTPC		
1.02.01	<p>operation of equipment, maintenance redundancy etc. and shall have a right to reject or accept any work or material which in his assessment is not complete to meet the requirements of this specification and/or applicable National and International standards mentioned elsewhere in the specification or otherwise.</p> <p>Bidder is requested to carefully examine and understand the specifications and seek clarifications, if required, to ensure that they have understood the specifications. Such clarifications should be within the time period as stipulated in ITB. The Bidder's offer should not carry any sections like clarifications, interpretations and/or assumptions. In the event of conflict between the Technical Specifications and the Conditions of Contract, the requirements as indicated in the technical specification shall govern, unless confirmed otherwise by the Employer in writing before the award of this contract, based on a written request from the Bidder for such a clarification. However, if the Bidder feels that, in his opinion, certain features brought out in his offer are superior to what has been specified, these may be highlighted separately.</p>			
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PART-A
VOLUME – II
PROJECT INFORMATION

CLAUSE NO.	<div>PROJECT INFORMATION</div> <div>एनटीपीसी NTPC</div>			
<div>1.01.00</div> <div>1.01.01</div> <div>1.01.02</div> <div>1.01.03</div> <div>1.02.00</div> <div>1.02.01</div> <div>1.03.00</div> <div>1.04.00</div>	<div> Introduction NTPC is planning to setup LNG based Gas engine power plant of (108 ±5 MW) near Galathea Bay. Re-gasified Liquefied Natural Gas (RLNG) shall be the fuel for the project. Power generation shall be carried out using RLNG-fired engine generator sets. The net capacity of plant shall be (108 ±5 MW) with 10 to 24 numbers of engine. Capacity Installation phasing: The total project capacity shall be (108 ±5 MW) which shall be installed as per following schedule: 1st Year (2029) – (84 ±5) MW 2nd Year (2030) – (12 ±3) MW 3rd Year (2031) – 0 MW 4th Year (2032) – Balance capacity to meet net plant capacity of 108 ±5 MW Out of total number of engines commissioned in 2029, maximum 2 number of identical engines shall cumulatively meet capacity of 12 ± 3 MW. Balance capacity to meet (108 ± 5 MW) shall be with identical engines complying to above installation schedule. The 2 number (maximum) of gensets meeting (12 ± 3 MW) shall be selected in such a way that transporting weight of each gensets along with trailer/trolley shall not exceed 100 Tons. Note: All the supplied engines shall be compatible to fire 20 to 25% Hydrogen by volume and same shall also be demonstrated during shop test of all engines </div> <div> Further to the information given in the following paragraphs, bidders are advised to visit the project site and collect data on local conditions as required for making a comprehensive and fully compliant bid in accordance with the requirements of various sections of bid documents including Technical Specifications. </div> <div> Site Location The proposed site for 108 MW LNG Gas Engine project located in Great Nicobar Island (GNI) which is the largest of the Nicobar Islands. The project Site is located near the southernmost tip of GNI near Galathea River. The power plant site is geographically located on opposite side of ICTT. The location at Galathea bay is approximately 45 km from Campbell Bay which is the headquarters of the southernmost frontier of India in the GNI. Approximate Project Coordinates - 6°49' N and 93°51' E </div> <div> Approach to Site The approach to the proposed project site is through ship or smaller aircrafts. The site can be approached through sea from Port Blair which is at distance of 520 kms. The site can be accessed by a road from Campbell Bay which is approximately 45 km distance. Campbell Bay is connected to Port Blair through Ship and Helicopter Services. The primary modes of transport to and from the mainland and within the archipelago are through government operated Ferris and limited air services through Dornier flights operated by Indian Airforce and through helicopters operated by Pawan Hans. </div> <div> Land Availability Approximately 96 acres (0.39 Sq. Km) of land is identified for the power infrastructure by ANIIDCO. Phase I of 108 MW shall be located inside this area. The proposed site is inhabited with vegetation and tree-cover and undulation with a variation in level from RL(+)4.0M to RL(+)65.0M. For further details tentative General Layout Plan (GLP) attached with Technical Specification may be referred </div>			
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1.05.00	Fuel Fuels envisaged for the proposed power plant is RLNG.			
1.05.01	RLNG Employer shall make RLNG available at a terminal point within plant premises. Expected composition of RLNG shall be as indicated at Annexure-I, Volume-II, Part-A of 'Project Information'. Further, bidder shall make arrangements for suitability of RLNG pressure as per requirement of the offered Engines.			
1.06.00	Water Availability			
1.06.01	Source Water will be provided by GNI Administration/ANIIDCO at one point near the proposed power plant, further water treatment for power plant equipment will be considered as a part of the plant facility and shall be in contractor's scope. Provision of Rainwater harvesting shall also be kept for the plant for collection of rainwater to be used for make-up.			
1.06.02	Quality of Raw Water Expected quality of Raw water to be supplied to the Plant shall be as indicated at Annexure – II of 'Project Information'. However, Bidder to perform analysis for determination of actual raw water quality.			
1.07.00	Meteorological Data			
1.07.01	Climatological data for the nearest observatory at Nancowry, Nicobar Island, A&N as published by the Meteorological Department, Government of India shall be as per Annexure – III of 'Project Information'.			
1.08.00	Wind Design Criteria Criteria for Wind resistant design of structures and equipment shall be as per Annexure-IVA & IVB.			
1.09.00	Earthquake Design Criteria Criteria for earthquake resistant design of structures and equipment shall be as per Annexure-V.			
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	<div>एनटीपीसी NTPC</div> <div>ANNEXURE - I</div> <div>EXPECTED SPECIFICATION OF RLNG</div> <table><thead><tr><th>Particulars</th><th>Unit</th><th>Minimum</th><th>Maximum</th><th>Typical</th></tr></thead><tbody><tr><td>1. COMPOSITION</td><td></td><td></td><td></td><td></td></tr><tr><td>a. Methane (C1)</td><td>% Molar</td><td>88.0</td><td>98.5</td><td>93.0</td></tr><tr><td>b. Ethane (C2)</td><td>% Molar</td><td>1.5</td><td>6.0</td><td>3.35</td></tr><tr><td>c. Propane (C3)</td><td>% Molar</td><td>-</td><td>3.5</td><td>1.75</td></tr><tr><td>d. Butane (C4)</td><td>% Molar</td><td>-</td><td>2.0</td><td>1.0</td></tr><tr><td>e. Pentane (C5) & heavier</td><td>% Molar</td><td>-</td><td>0.1</td><td>0.1</td></tr><tr><td>f. Nitrogen</td><td>% Molar</td><td>-</td><td>1.0</td><td>0.8</td></tr><tr><td>2. Gross Heating Value</td><td>Kcal/standard m³</td><td>8994</td><td>10508</td><td>-</td></tr><tr><td>3. Pressure</td><td>Bar (abs.)</td><td>13</td><td>14</td><td>-</td></tr><tr><td>4. Temperature</td><td>Degree C</td><td>25</td><td>35</td><td>-</td></tr><tr><td>5. Moisture</td><td>Kg/Million SM3</td><td></td><td>112</td><td></td></tr><tr><td>6. Impurities</td><td></td><td></td><td></td><td></td></tr><tr><td>a. Carbon dioxide</td><td>ppm – mole</td><td>-</td><td>100</td><td></td></tr><tr><td>b. Oxygen</td><td>ppm – mole</td><td>-</td><td>50</td><td></td></tr><tr><td>c. Hydrogen Sulphide</td><td>mg/Nm3</td><td>-</td><td>5</td><td></td></tr><tr><td>d. Mercaptan Sulphur</td><td>mg/Nm3</td><td></td><td>7</td><td></td></tr><tr><td>e. Total Sulphur (including mercaptans)</td><td>mg/Nm3</td><td></td><td>30</td><td></td></tr><tr><td>6. CONTAMINANTS</td><td></td><td></td><td></td><td></td></tr><tr><td>Trace Metals</td><td></td><td></td><td></td><td></td></tr><tr><td>i. Pb + Zn</td><td>ppm (wt)</td><td>-</td><td>0.50</td><td></td></tr><tr><td>ii. Na + K</td><td>ppm (wt)</td><td>-</td><td>0.30</td><td></td></tr><tr><td>iii. Vanadium</td><td>ppm (wt)</td><td>-</td><td>0.50</td><td></td></tr><tr><td>iv. Calcium</td><td>ppm (wt)</td><td>-</td><td>2.0</td><td></td></tr><tr><td>v. Magnesium</td><td>ppm (wt)</td><td>-</td><td>2.0</td><td></td></tr><tr><td>vi. Sum of heavy metals</td><td>ppm (wt)</td><td>-</td><td>1.0</td><td></td></tr></tbody></table> <p>Note: Typical composition has been given only as a reference condition for Performance Guarantee (refer clause 3.01.00, Volume – IV). Actual composition of the gas generally may be anything within the range indicated. However, the engine shall also be designed to run on gas fuel with methane no. lowest upto 65.</p>					Particulars	Unit	Minimum	Maximum	Typical	1. COMPOSITION					a. Methane (C1)	% Molar	88.0	98.5	93.0	b. Ethane (C2)	% Molar	1.5	6.0	3.35	c. Propane (C3)	% Molar	-	3.5	1.75	d. Butane (C4)	% Molar	-	2.0	1.0	e. Pentane (C5) & heavier	% Molar	-	0.1	0.1	f. Nitrogen	% Molar	-	1.0	0.8	2. Gross Heating Value	Kcal/standard m ³	8994	10508	-	3. Pressure	Bar (abs.)	13	14	-	4. Temperature	Degree C	25	35	-	5. Moisture	Kg/Million SM3		112		6. Impurities					a. Carbon dioxide	ppm – mole	-	100		b. Oxygen	ppm – mole	-	50		c. Hydrogen Sulphide	mg/Nm3	-	5		d. Mercaptan Sulphur	mg/Nm3		7		e. Total Sulphur (including mercaptans)	mg/Nm3		30		6. CONTAMINANTS					Trace Metals					i. Pb + Zn	ppm (wt)	-	0.50		ii. Na + K	ppm (wt)	-	0.30		iii. Vanadium	ppm (wt)	-	0.50		iv. Calcium	ppm (wt)	-	2.0		v. Magnesium	ppm (wt)	-	2.0		vi. Sum of heavy metals	ppm (wt)	-	1.0	
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CLAUSE NO.	PROJECT INFORMATION			
	ANNEXURE – II			
	Raw Water Analysis			
	SN	Constituent	As	mg/l (except pH & turbidity)
	1.	Calcium	CaCO ₃	73
	2.	Magnesium	CaCO ₃	34
	3.	Sodium + Potassium	CaCO ₃	49
	4.	Total Cation	CaCO ₃	156
	5.	Total Hardness	CaCO ₃	107
	6.	p Alkalinity	CaCO ₃	0
	7.	m Alkalinity	CaCO ₃	116
	8.	Chloride	CaCO ₃	36
	9.	Sulphate	CaCO ₃	4
	10.	Total Anion	CaCO ₃	156
	11.	Reactive Silica	SiO ₂	23
	12.	Colloidal Silica	SiO ₂	5
	13.	Total Silica	SiO ₂	28
	14.	Iron (as Fe)	ppm	1
	15.	pH value	-	7.0-8.0
	16.	Turbidity	NTU	500 (Max)
	17.	TDS	ppm	235
	18.	TSS	ppm	800 (Max)
	19.	Temperature (Range)	deg C	26-40
	20.	KMnO ₄ (organic matter)	ppm	4
	21.	TOC	ppm	8
	22.	Chemical Oxygen Demand (COD)	ppm	5
	23.	Biological Oxygen Demand (BOD)	ppm	7
24.	Equivalent Mineral Acid (EMA)	ppm	40	
25.	Dissolved Oxygen (DO)	ppm	10	
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	<div>ANNEXURE – III</div> <div>CLIMATOLOGICAL DATA</div>			
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स्टेशन : ननकौरी
STATION : NANCOWRY

अक्षांश

LAT.

7° 59'

देशांतर

LONG.

93° 32'

माध्य समुद्र तल से ऊंचाई

HEIGHT ABOVE M.S.L.

मीटर

METRES

प्रेक्षणों पर आधारित

BASED ON OBSERVATIONS

1991-2020

माह	स्टेशन का सतह दाब	वायु तापमान										आद्रता		मेघ की मात्रा		मासिक योग	वर्षा के दिनों की संख्या	वर्ष सहित सबसे नम महीने का योग	सबसे शुष्क महीने का योग	24 घंटे की सबसे भारी वर्षा	दिनांक और वर्ष	माध्य पवन गति	
		माध्य						चरम				सापेक्ष आद्रता	वाष्प दाब	समस्त मेघ	निम्न मेघ								
		शुष्क बलब	नम बलब	दैनिक अधिकतम	दैनिक न्यूनतम	माह में उच्चतम	माह में निम्नतम	उच्चतम	दिनांक और वर्ष	निम्नतम	दिनांक और वर्ष												
MONTH	STATION LEVEL PRESSURE	AIR TEMPERATURE										HUMIDITY		CLOUD AMOUNTS		MONTHLY TOTAL	NO. OF DAYS	TOTAL IN WETTEST MONTH WITH YEAR	TOTAL IN DRIEST MONTH WITH YEAR	HEAVIEST FALL IN 24 HOURS	DATE AND YEAR	MEAN WIND SPEED	
		MEAN						EXTREMES				RELATIVE HUMIDITY	VAPOUR PRESSURE	ALL CLOUDS	LOW CLOUDS								
		DRY BULB	WET BULB	DAILY MAX	DAILY MIN	HIGHEST IN THE MONTH	LOWEST IN THE MONTH	HIGHEST	DATE AND YEAR	LOWEST	DATE AND YEAR												
	एच.पी.ए hPa	डि. सें. °C	डि. सें. °C	डि. सें. °C	डि. सें. °C	डि. सें. °C	डि. सें. °C	डि. सें. °C		डि. सें. °C		प्रतिशत %	एच.पी.ए. hPa	आकाश के अष्टमांश Oktas of sky	मि.मी. mm		मि.मी. mm	मि.मी. mm	मि.मी. mm		कि.मी.प्र.घ. Kmph		
जनवरी JAN	I	1010.2	28.5	25.5	31.1	24.3	32.8	20.9	35.4	29	11.0	12	77	30.2	4.4	2.8	141.4	6.4	718.6	0.0	153.3	19	
	II	1007.8	27.7	25.1							2006	1998	81	30.0	4.4	2.9								2017	1964
फरवरी FEB	I	1009.9	28.5	25.6	31.6	24.8	33.2	22.1	36.4	17	18.4	20	78	30.6	4.3	2.8	67.0	3.9	235.3	0.0	141.4	13	
	II	1007.5	28.2	25.5						1980	2013	79	30.6	4.3	2.9	1956								2016
मार्च MAR	I	1009.4	29.3	26.2	32.3	25.1	34.4	22.8	37.2	29	18.2	25	78	31.7	4.1	2.8	68.4	3.7	222.4	0.0	102.4	25	
	II	1006.9	29.0	26.2						1997	2007	79	31.7	4.2	3.1	2011								2006
अप्रैल APR	I	1008.7	29.5	26.6	32.8	25.4	34.7	22.9	39.2	6	18.0	10	79	32.6	4.5	3.1	104.6	6.6	501.8	9.2	135.5	25	
	II	1006.0	29.3	26.5						1981	1991	79	32.3	4.6	3.2	1974								1974
मई MAY	I	1007.7	28.8	26.5	31.4	25.1	34.0	22.4	38.6	8	18.9	15	83	32.9	5.1	3.4	298.5	13.9	715.2	0.0	199.6	21	
	II	1005.4	28.2	26.1						1985	1952	84	32.3	5.2	3.6	1967								2001
जून JUN	I	1006.9	28.4	26.3	30.7	25.3	33.2	22.0	37.4	24	17.0	1	84	32.6	5.3	3.4	261.6	12.8	621.8	38.0	257.6	1	
	II	1005.1	28.0	26.0						1999	1998	84	32.0	5.4	3.6	2013								1965
जुलाई JUL	I	1006.9	28.2	26.2	30.2	25.0	32.7	22.3	37.6	4	14.2	9	85	32.6	5.2	3.4	238.8	13.2	459.2	49.1	119.5	30	
	II	1005.1	27.8	26.0						2005	2000	85	32.2	5.3	3.5	2010								2002
अगस्त AUG	I	1007.7	28.0	26.0	30.1	24.7	32.0	21.7	35.4	25	13.9	23	85	32.1	5.1	3.3	205.6	12.5	440.2	61.5	133.5	28	
	II	1005.6	27.6	25.8						2005	2007	85	31.7	5.0	3.3	1987								1984
सितम्बर SEP	I	1008.6	27.7	25.9	29.9	24.4	31.9	21.6	35.4	14	14.0	25	86	32.0	5.2	3.1	247.8	13.8	668.3	0.0	121.4	6	
	II	1006.3	27.2	25.5						2005	1997	87	31.4	5.2	3.2	1960								1964
अक्तूबर OCT	I	1009.1	27.7	25.9	30.1	24.3	32.3	21.3	36.2	29	15.0	8	86	31.9	5.1	3.3	243.4	14.4	581.3	80.0	157.8	27	
	II	1006.7	27.1	25.4						1983	1996	87	31.1	5.2	3.6	1961								1986
नवम्बर NOV	I	1009.1	27.9	26.0	30.4	24.4	32.6	22.2	35.4	6	18.8	17	85	32.1	4.9	3.3	292.3	14.3	737.0	6.2	238.8	22	
	II	1006.6	27.2	25.6						2005	1978	87	31.5	4.9	3.4	2001								1999
दिसम्बर DEC	I	1009.8	28.3	25.7	30.6	24.4	32.4	21.8	36.0	19	15.8	28	81	31.0	4.7	3.1	242.2	10.4	709.7	6.4	191.4	5	
	II	1007.3	27.3	25.2						1990	1997	84	30.5	4.7	3.4	1980								1992
वार्षिक योग या माध्य ANNUAL TOTAL OR MEAN	I	1008.7	28.4	26.0	30.9	24.8	35.4	18.7	39.2	6	11.0	12	82	31.8	4.8	3.1	2411.7	125.8	3241.9	1733.8	257.6	1	
	II	1006.4	27.9	25.7						4	1981	1	1998	83	31.4	4.9								3.3	1996	1997	6	1963

जलवायवी सारणी १९९१-२०२० CLIMATOLOGICAL TABLE 1991-2020

स्टेशन : ननकौरी
STATION : NANCOWRY

के.शा.प्रदेश : अंडमान और निकोबार द्वीप समूह
UT : ANDAMAN AND NICOBAR ISLANDS

सूचकांक : 43382
INDEX NO. :

	मौसम परिघटना						पवन													मेघ										दृश्यता					
	के साथ दिनों की संख्या						पवन की गति (कि.मी.प्र.घं.) का माह में दिनों की संख्या				पवन की दिशा के दिनों की संख्या का प्रतिशत									मेघ मात्रा (सभी मेघ) सहित दिनों की संख्या – अष्टमांश					निम्न स्तरी मेघ मात्रा सहित दिनों की संख्या – अष्टमांश					दृश्यता सहित दिनों की संख्या					
माह	वर्षण 0.3 मि.मी.या अधिक	ओले	गर्जन	कुहरा	धूल भरी आंधी	चंड वात	62 या अधिक	20-61	1-19	0	उ	उपू	पू	दपू	द	दप	प	उप	शांत	0	1-2	3-5	6-7	8	0	1-2	3-5	6-7	8	कुहरा 8	1 कि.मी. तक	1-4 कि.मी.	4-10 कि.मी.	10-20 कि.मी.	20 कि.मी. से अधिक
	WEATHER PHENOMENA						WIND													CLOUD										VISIBILITY					
	No. OF DAYS WITH						NO. OF DAYS WITH WIND SPEED (Kmph)				PERCENTAGE NO. OF DAYS WIND FROM									NO. OF DAYS WITH CLOUD AMOUNT (ALL CLOUDS) OKTAS					NO. OF DAYS WITH LOW CLOUD AMOUNT OKTAS					NO. OF DAYS WITH VISIBILITY					
MONTH	PPT 0.3 mm OR MORE	HAIL	THUN DER	FOG	DUST STORM	SQUALL	62 OR MORE	20-61	1-19	0	N	NE	E	SE	S	SW	W	NW	CALM	0	1-2	3-5	6-7	8	0	1-2	3-5	6-7	8	FOG 8	UPTO 1 Km.	1-4 Kms.	4-10 Kms.	10-21 Kms.	OVER 20 Kms.
जनवरी JAN	I II	6.7 0	0 0	0 0	0 0	0 0	0 0	0 0	22 20	9 11	1 1	27 21	22 16	3 6	2 2	4 4	1 1	5 4	35 45	0 0	4 4	20 19	6 6	1 2	2 2	11 11	16 15	2 2	0 1	0 0	0 0.1	1.7 5.9	7.7 12.3	9.6 8.6	12 4.1
फरवरी FEB	I II	4.9 0	0 0	0 0	0 0	0 0	0 0	0 0	19 18	9 10	2 2	27 22	23 19	2 3	0 0	4 4	1 1	3 2	38 47	0 0	4 4	19 17	5 6	0 1	1 1	11 10	14 15	2 2	0 0	0 0	0 0.1	0.8 3.5	6.7 8.6	8.1 11.6	12.3 4.2
मार्च MAR	I II	4.6 0	0 0	0 0	0 0	0 0	0 0	0 0	21 10	10 21	2 1	26 22	17 10	7 4	3 2	2 1	1 2	1 2	41 56	0 0	5 5	20 20	5 5	1 1	1 1	13 12	15 15	2 2	0 1	0 0	0.1 0	1.1 2.8	6.8 13.3	9.2 9.6	13.9 5.3
अप्रैल APR	I II	7.7 0	0 0	0 0	0 0	0 0	0 0	0 0	12 8	18 22	2 2	13 10	15 11	5 3	2 1	8 6	1 0	1 3	53 64	0 0	4 4	18 19	7 6	1 1	1 1	10 11	15 14	3 3	1 1	0 0	0 0.1	1.1 4.8	6.8 11.4	7.8 9	14.3 4.7
मई MAY	I II	16 0	0 0	0 0	0 0	0 0	0 0	1 1	23 21	7 9	3 2	15 13	4 5	8 4	13 14	24 20	2 2	2 2	29 38	0 0	2 2	17 17	8 8	4 4	0 0	9 9	18 18	3 2	1 2	0 0	0.1 0.3	3.1 7.4	8.5 13.5	7 6.3	12.3 3.5
जून JUN	I II	15.4 0	0 0	0 0	0 0	0 0	0 0	1 1	25 24	4 5	3 3	13 11	4 5	7 4	15 14	40 40	0 2	1 1	17 20	0 0	1 1	17 17	9 8	3 4	0 0	9 8	17 17	2 2	2 3	0 0	0 0.2	2.5 6.7	8.6 13	6.3 6.6	12.6 3.5
जुलाई JUL	I II	17.2 0	0 0	0 0	0 0	0 0	0 0	1 1	26 26	4 4	3 2	11 12	4 4	2 2	16 15	43 43	5 5	2 1	14 16	0 0	2 2	17 15	10 10	2 4	1 1	8 8	18 17	3 3	1 2	0 0	0.1 0	2.7 7.9	8.5 12.5	11.1 7.5	8.6 3
अगस्त AUG	I II	15.8 0	0 0	0 0	0 0	0 0	0 0	2 2	25 25	4 4	2 1	12 11	5 6	1 1	20 20	44 41	1 3	1 1	14 16	0 0	3 3	16 16	9 8	3 4	1 0	9 10	18 17	2 2	1 2	0 0	0.1 0.2	3.7 5.9	8.1 13	10.4 8.6	8.6 3.3
सितम्बर SEP	I II	17 0	0 0	0 0	0 0	0 0	0 0	0 0	25 23	5 7	1 1	6 6	1 1	2 2	18 17	48 42	3 2	0 1	21 28	0 0	2 2	16 16	9 9	3 3	1 1	9 10	18 16	2 2	0 1	0 0	0 0.2	2.7 5.7	6.7 14.5	8.7 6.8	12 2.8
अक्तूबर OCT	I II	17.3 0	0 0	0 0	0 0	0 0	0 0	0 0	18 10	13 21	0 0	4 3	5 1	2 3	14 10	24 18	2 2	1 0	48 63	0 0	2 2	16 15	10 10	3 4	1 1	10 9	15 15	4 4	1 2	0 0	0 0.8	2 8.4	7.9 14.4	10 4.9	11.1 2.5
नवम्बर NOV	I II	15.1 0	0 0	0 0	0 0	0 0	0 0	0 0	12 8	18 22	3 2	9 6	10 7	6 4	8 6	9 8	1 1	2 1	52 65	0 0	2 2	17 19	8 6	3 3	0 0	9 9	17 17	3 3	1 1	0 0	0.1 1.3	2.3 7.4	7.6 12.4	10.9 6.6	9.1 2.3
दिसम्बर DEC	I II	11.5 0	0 0	0 0	0 0	0 0	0 0	0 0	21 12	10 19	4 3	19 15	19 13	7 5	2 2	6 5	2 3	4 2	37 52	0 0	3 3	18 19	7 6	3 3	1 1	11 10	16 15	2 3	1 2	0 0	0 0.7	2.7 9.4	9 12.5	7.4 5.8	11.8 2.6
वार्षिक योग या माध्य ANNUAL TOTAL OR MEAN	I II	149.3 0	0 0	0 0	0 0	0 0	0 0	6 6	260 239	99 120	2 2	15 13	11 8	4 3	10 9	22 20	2 2	2 2	32 41	1 1	33 34	212 210	93 86	26 34	9 8	120 114	197 196	29 29	10 18	0 0	0.7 4	26.4 75.8	92.7 153.2	102.6 90.2	142.5 41.8

CLAUSE NO.	PROJECT INFORMATION			<div>एनटीपीसी NTPC</div>												
	<div>ANNEXURE - IVA</div> <div>CRITERIA FOR WIND RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT</div> <p>All structures shall be designed for wind forces in accordance with IS: 875 (Part-3) and as specified in this document. See Annexure- IVB for site specific information.</p> <p>Along wind forces shall generally be computed by the Peak (i.e. 3 second gust) Wind Speed method as defined in the standard.</p> <p>Along wind forces on slender and wind sensitive structures and structural elements shall also be computed, for dynamic effects, using the Gust Factor or Gust Effectiveness Factor Method as defined in the standard. The structures shall be designed for the higher of the forces obtained from Gust Factor method and the Peak Wind Speed method.</p> <p>Analysis for dynamic effects of wind must be undertaken for any structure which has a height to minimum lateral dimension ratio greater than "5" and/or if the fundamental frequency of the structure is less than 1 Hz.</p> <p>Susceptibility of structures to across-wind forces, galloping, flutter, ovaling etc. should be examined and designed/detailed accordingly following the recommendations of IS:875 (Part-3) and other relevant Indian standards.</p> <p>It should be estimated if size and relative position of other structures are likely to enhance the wind loading on the structure under consideration. Enhancement factor, if necessary, shall suitably be estimated and applied to the wind loading to account for the interference effects.</p> <div>Damping in Structures</div> <p>The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for:</p> <table><tr><td>a) Welded steel structures</td><td>:</td><td>1.0%</td></tr><tr><td>b) Bolted steel structures</td><td>:</td><td>2.0%</td></tr><tr><td>c) Reinforced concrete structures</td><td>:</td><td>1.6%</td></tr><tr><td>d) Steel-stacks</td><td>:</td><td>As per IS: 6533 & CICIND Model Code, whichever is more critical.</td></tr></table>				a) Welded steel structures	:	1.0%	b) Bolted steel structures	:	2.0%	c) Reinforced concrete structures	:	1.6%	d) Steel-stacks	:	As per IS: 6533 & CICIND Model Code, whichever is more critical.
a) Welded steel structures	:	1.0%														
b) Bolted steel structures	:	2.0%														
c) Reinforced concrete structures	:	1.6%														
d) Steel-stacks	:	As per IS: 6533 & CICIND Model Code, whichever is more critical.														
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC NO: CS-6401-001-2	Volume II Project Information	Page 6 of 8												

CLAUSE NO.	PROJECT INFORMATION		<div>एनटीपीसी NTPC</div>												
	<div>ANNEXURE - IVB</div> <div>SITE SPECIFIC DESIGN PARAMETERS</div> <p>The various design parameters, as defined in IS: 875 (Part-3), to be adopted for the project site shall be as follows:</p> <table><tr><td>a.</td><td>The basic wind speed “V_b” at ten meters above the mean ground level</td><td>44 meters/ second</td></tr><tr><td>b.</td><td>The risk coefficient "K1"</td><td>1.07</td></tr><tr><td>c.</td><td>The risk coefficient “K4”</td><td>1.15</td></tr><tr><td>d.</td><td>Category of terrain</td><td>Category-1</td></tr></table> <p>Note: Notwithstanding the values of the above mentioned parameters, the design wind pressure so computed at any point shall not be taken less than 1500 N/M² for all classes of structures, i.e. A, B & C, as defined in IS: 875 (Part-3).</p>			a.	The basic wind speed “V _b ” at ten meters above the mean ground level	44 meters/ second	b.	The risk coefficient "K1"	1.07	c.	The risk coefficient “K4”	1.15	d.	Category of terrain	Category-1
a.	The basic wind speed “V _b ” at ten meters above the mean ground level	44 meters/ second													
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d.	Category of terrain	Category-1													
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CLAUSE NO.	PROJECT INFORMATION			<div>एनटीपीसी NTPC</div>																
	<div>ANNEXURE - V</div> <div>PAGE 1 OF 1</div> <div>ANDAMAN & NICOBAR GAS POWER PROJECT</div> <div>CRITERIA FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT</div> <div>All structures and equipment shall be designed for seismic forces using the other provisions in accordance with IS:1893 (Part 1):2002 and IS:1893 (Part 4):2005. Pending finalisation of Parts 2, 3 and 5 of IS:1893, provisions of part 1 shall be read along with the relevant clauses of IS:1893:1984, for structures other than the buildings and industrial structures including stack-like structures.</div> <div>Site falls in Seismic zone V.</div> <div>Damping in Structures</div> <div>The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for:</div> <table><tr><td>a)</td><td>Steel structures</td><td>:</td><td>2%</td></tr><tr><td>b)</td><td>Reinforced Concrete structures</td><td>:</td><td>5%</td></tr><tr><td>c)</td><td>Reinforced Concrete Stacks</td><td>:</td><td>3%</td></tr><tr><td>d)</td><td>Steel stacks</td><td>:</td><td>2%</td></tr></table>				a)	Steel structures	:	2%	b)	Reinforced Concrete structures	:	5%	c)	Reinforced Concrete Stacks	:	3%	d)	Steel stacks	:	2%
a)	Steel structures	:	2%																	
b)	Reinforced Concrete structures	:	5%																	
c)	Reinforced Concrete Stacks	:	3%																	
d)	Steel stacks	:	2%																	
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC NO: CS-6401-001-2	Volume II Project Information	Page 8 of 8																


PART-A
VOLUME - III
SCOPE OF SUPPLY & SERVICES, TERMINAL
POINTS AND EXCLUSIONS

CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS		
	<div>एनटीपीसी NTPC</div> <div>SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS</div> <div>1.00.00 GENERAL</div> <div>1.01.00 Scope of Work in respect of equipment and systems mentioned herewith shall be in accordance with the provisions of various sections of Technical Specifications and such as to deliver a fully operational plant that meets the Intent of the Specification.</div> <div>1.02.00 The Scope of Work shall include Planning, Design, Engineering, Manufacture, Fabrication, Assembly, Pre-shipment Testing at manufacturer's works, Packing, Transportation, Handling, Delivery at Plant Site, Storage, Installation, Interconnection with related plant and equipment, Pre-Commissioning, Commissioning, Initial Operation, Conductance of Acceptance Tests and subsequent One year supervision during operation and maintenance with deputation of 1 operation and 1 maintenance expert post successful completion of initial/trial operations & Performance guarantee tests including Demonstration tests of initial 84MW (whichever occurs later).</div> <div>1.03.00 This Volume describes only the brief scope for Supplies and Services. However, the Scope includes all such material, equipment and services which may not be specifically stated in the specifications but required for completeness of the equipment/ systems for meeting the Intent of Specification and Specification requirements. The work shall be consistent with modern practices and shall comply with all applicable codes, standards, guidelines and safety requirements in force as on the date of award of the contract.</div> <div>1.04.00 The bidders are requested to submit their offer with best ratings and specifications. Ratings of any items, equipment or auxiliaries, building space, that are not asked to be specified in the technical proposals shall be decided at the time of according approval to design basis reports, drawings and specifications, during project execution. The bidder shall be presumed to have considered all items and its' ratings in his supply scope in his bid. Increase of price on account of difference in any items and its' ratings between those estimated by the bidder and those approved by the Employer shall not be allowed whatsoever.</div> <div>1.05.00 In the event of conflict between requirements of any two clauses of specification, Employer's discretion shall apply unless otherwise confirmed by the Employer in writing before the award of the contract, based on a written request from the Contractor.</div> <div>1.06.00 Contractor shall provide all equipment, devices and systems on as required basis subject to the minimum quantities indicated in the following clauses.</div> <div>2.00.00 ENGINE GENERATOR SETS AND AUXILIARIES</div> <div>2.01.00 The net capacity of Plant shall be in the range of 108 ±5 MW with 10 to 24 nos. The first 2 engines with cumulative capacity of (12 ± 3) MW shall be identical to</div>		
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2	VOLUME III SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS	Page 1 of 95

CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS		
	<div><div></div><div>एन टी पी सी NTPC</div></div> <p>each other. Similarly balance engines supplied to meet (108 ± 5) MW shall also be identical units.</p> <p>2.02.00 Each Engine-Generator set (Genset) shall necessarily include but not be limited to the following:</p> <ul style="list-style-type: none">i. All Stationary and Rotating Components of Engineii. Rotor Support System (Bearings etc.) and all interconnecting couplingsiii. Engine Exhaust systemiv. AC Generator along with excitation systemv. Foundation Bolts, Base Plate and Support Structuresvi. Any other component/system as per the standard proven practice and as required for the Genset model offered. <p>2.03.00 Integral Auxiliaries and Support Systems for each Genset</p> <p>Integral Auxiliaries for Genset shall necessarily include the following:</p> <ul style="list-style-type: none">i. Lube Oil System complete with Pumps, Filters, Coolers, oil purifying system, Valves and Piping.ii. Turbocharging systemiii. Governing Systemiv. Protective Devicesv. Combustion systemvi. Gaseous-Fuel Supply and Metering System complete with Filter, Piping, Stop/ Control Valves and Distribution Headers etc.vii. Startup system including Start up Air compressor & Air Bottles/ Motorised Start up system as per standard practice of OEM.viii. Turning Gear systemix. Engine Cooling Water systemsx. Gas leakage Detection systemxi. Air Intake Systemxii. Equipment Cooling water system complete with all required piping and valvesxiii. 2no. of EOT cranes per engine hall as per IS 3177 (Common for all the engines in each hall). Each crane capable of lifting 105% of the single heaviest equipment/components (Except Gas Engines) including lifting beam and slings etc. (as applicable) for maintenance and loading/unloading in the engine hall. However, min. 5 Tons capacity EOT cranes each to be provided.xiv. Waste liquid collection and disposal system		
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2	VOLUME III SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS	Page 2 of 95


CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS	<div>एन टी सी NTPC</div>	
	<p>xv. Common or Unitized NOx control system as per standard proven practise of the engine OEM</p> <p>xvi. Any other system required for continuous and trouble-free operation of Engines in all the specified operating regimes and ambient conditions.</p> <p>2.04.00 Equipment and systems mentioned above shall be in accordance with the specification requirements of Part B and relevant clauses of Part A of Section VI of Technical Specification.</p> <p>3.00.00 GAS ENGINE EXHAUST SYSTEM</p> <p>3.01.00 Gas Engine Exhaust System</p> <p>Complete ducting system from the gas engine outlet to the Chimney. This will include Exhaust gas silencers, Expansion bellows, Rupture Discs, Exhaust Duct insulation and Supports etc.</p> <p>Provision of blind flange with proper sealing to be kept in the Exhaust lines of Engines to facilitate installation of future Heat Recovery system.</p> <p>3.02.00 Valves/Gates/Dampers</p> <p>All necessary isolating, regulating, check and relief valves, gates and dampers etc.</p> <p>3.03.00 Steel Stack</p> <p>i. Stack suitable to discharge flue gases at height of "H" meters (calculated as $H = 14XQ^{0.3}$, where Q = SO₂ emission in Kg/hour) from the finished grade level and complying CPCB and MoEF&CC norms subject to minimum height of 30 meters.</p> <p>ii. Each stack shall be provided with complete supporting structure.</p> <p>iii. Each stack shall be provided with continuous online NOx, SO₂ & CO analyzer equipment. Suitable approach and platform for these shall also be provided. NOx, SO₂ and CO values shall be made available in CCR through required instrumentation.</p> <p>4.00.00 Supporting Steel Works</p> <p>i. All supporting steel works for Gensets and its auxiliaries.</p> <p>ii. Necessary structural steel for stack, Dampers, ducting roof, weather canopies and the platforms at the sides of the Gensets and in other areas.</p> <p>5.00.00 All Galleries, walkways and Platforms</p> <p>These shall comply with all safety requirements as detailed in Volume – IV (Part A, Section VI) and relevant equipment specifications (Part B, Section VI).</p> <p>6.00.00 Thermal Insulation</p> <p>All necessary Insulation including cladding, lagging, reinforcement, wire mesh, cleats, supports etc. for Engines (if applicable), piping, valves ducting, stacks</p>		
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2	VOLUME III SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS	Page 3 of 95

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	<p>etc. conforming to the requirements as brought out in the equipment specifications.</p> <p>If thermal insulation for engine is applicable, it shall be as per engine manufacturer standard practice.</p> <p>7.00.00 Pipes and fittings</p> <p>i. Piping, fittings, plugs, stubs, flanges and other accessories for the piping systems identified above and as per approved schemes.</p> <p>ii. All standard and non-standard matching pieces as needed within piping systems and for connection of piping systems to various equipments/ tanks/ vessels/ valves etc.</p> <p>iii. Pipe stubs for mounting thermowells and other instrumentation along with necessary reducers/ matching pieces and instrument tubing.</p> <p>8.00.00 Paint and primers as required and suitable for the environment/conditions prevailing at site.</p> <p>9.00.00 Miscellaneous Erection and Cleaning Material</p> <p>i. All erection material such as bolts, nuts, washers, gaskets, electrodes, filler materials, welding gas, consumable inserts and backing rings, accessories and miscellaneous specialties required for the proper installation of piping, ducting and all systems.</p> <p>ii. All valves, tanks, pumps, chemicals, caps, blanking plates, spool pieces, auxiliary structural steel, flow nozzles & specialties and other accessories as required to complete, chemical cleaning operation and hydro testing of piping systems as per specification and approved schemes.</p> <p>iii. Weather hood for pipes crossing ceilings and walls.</p> <p>iv. All other materials required for completing the erection, testing & commissioning.</p> <p>10.00.00 FUEL GAS SYSTEM</p> <p>10.01.00 RLNG shall be made available by the owner/client within the plant premises. If required, Bidder shall make necessary arrangements for level of gas pressure required for the offered Gas Engine(s). Bidder shall provide common Gas flow meter (common to all Engines) as well as individual gas flow meter for each Gas Engine as per relevant standards. Location of above meters shall be finalized during detailed Engineering.</p> <p>10.02.00 Fuel Gas System</p> <p>i. Emergency Stop Valve (which can be operated remotely from control room) at the inlet to the system to cut-off supply of gas to the power station in case of emergency. Further manual isolating valve shall also be provided at the inlet of Gas terminal point.</p> <p>ii. Any other system/equipment required to meet the intent of specification.</p> <p>11.00.00 WATER SYSTEM</p>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2	VOLUME III SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS	Page 4 of 95	

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	<p>ii) 2x100% capacity Reverse Osmosis (RO) Streams/trains module rack assemblies complete with permeators, sampling facilities and automatically operated reject control valves.</p> <p>iii) Complete suck-back arrangement along with Permeate booster pumps (If applicable).</p> <p>iv) RO Flushing & Cleaning Systems - Complete Chemical cleaning and Flushing system comprising the necessary tanks and pumps for RO trains/streams. 2 x 100% flushing pumps (if applicable) shall be provided to enable flush-out of the RO unit stream including RO pump.</p> <p>v) Ono (1) Nos. (twin section) of RO permeate water tank to store RO permeate water.</p> <p>vi) 2x100% capacity RO permeate water transfer pumps to supply the treated water from RO permeate tank for its use at downstream applications.</p> <p>vii) All required facilities and systems such as chlorination, anti-scalant dosing, degasification system (as applicable), any required system etc. for UF-RO system.</p> <p>viii) Dosing systems complete for the Post-treatment- Alkali dosing system of treated water, Neutralization system by addition of sodium hypochlorite. Remineralisation system by addition of calcium chloride to balance the hardness of treated water.</p> <p>i) RO REJECT WATER HANDLING SYSTEM –</p> <p>i) One (1) number of RO reject water collection sump, and its disposal system comprises of 2x100% of capacity RO reject water transfer pump to transfer the RO reject from collection sump to Evaporation Pond.</p> <p>ii) One (1) Nos overflow sump (underground) to store overflow water from Evaporation Pond.</p> <p>iii) 2x100% of capacity horticulture/ irrigation water pumps to pump the overflow water from overflow sump for its use in horticulture & other internal suitable purpose.</p> <p>iv) 2x100% of capacity sea water pumps to pump the overflow water from overflow sump to discharge into a reject Well at Sea.</p> <p>v) Reject water from the reject well shall further be carried to the outfall location by gravity through HDPE pipeline. The entire pipeline shall be laid on the seabed and anchored to anchor blocks. Mechanical items required for anchoring pipeline to anchor blocks are in contractor's scope & shall be of suitable MOC.</p> <p>vi) At the outfall location, the pipeline will rise above seabed at a T-junction into a diffuser block designed to disperse and distribute the reject water (brine). Required riser pipes & check valves diffuser arrangement and of suitable MOC are to be provided by contractor.</p> <p>j) EFFLUENT TREATMENT PLANT (ETP) SYSTEM</p> <p>i) Oily wastewater from various plant areas shall be separately collected in respective area pits and to be pumped via 2x100% oily water transfer pumps at each respective area pits to Oil water separation system comprises of one no (1) oil water collection sump, 1x100% oil water separator system including 1x100% oil skimmer belt ,3 no's of waste oil collection tank of each capacity at least 200 Liter.</p> <p>ii) Non-oily water, discharged from oil water separator system shall be routed/pumped (if require) to one (1) no wastewater collection sump for its further treatment.</p> <p>iii) One number RCC Plant Effluent sump to collect Plant effluent / tanks drain (non-oily water) from various areas along with DMF & UF backwash water.</p> <p>iv) Plant effluents (Non-oily Water) shall be separately collected in respective area pits and the same shall be routed/pumped (if required) via 2x100% Pit pumps at each respective area pits to Plant Effluent Sump.</p> <p>v) 2x100% effluent transfer pumps to pump the plant effluent water from plant effluent sump to wastewater collection sump.</p> <p>vi) One no (1) wastewater collection sump equipped with 1x100% oil skimmer belt system.</p>	
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	<p>vii) 2x100% wastewater transfer pump to pump the water from wastewater collection sump to Tube settler / Lamella type clarifier (ETP).</p> <p>viii) 1x100% capacity Tube settler / Lamella type clarifier (ETP) along with associated system, required scrapper mechanism system etc. Tube settler / Lamella type clarifier shall be equipped with flash mixer and flocculation chamber upstream.</p> <p>ix) One (1) no of central monitoring basin (CMB) for collection of decanted/treated water from lamella clarifiers/tube settlers (ETP).</p> <p>x) The treated water of CMB conforming to the prescribed standards shall be recirculated and reused in service water system / Fire Water system via 2x100% Treated Water transfer pump.</p> <p>xi) Complete chemical dosing systems for the ETP system.</p> <p>k) CHEMICAL SUPPLY, STORAGE & DOSING SYSTEM FOR COMPLETE WATER SYSTEM</p> <p>i) 2x100% of capacity of each type of pump for chemical transfer, preparation and dosing.</p> <p>ii) Two numbers of each type of chemical measuring tanks of required capacity (Minimum 0.5 Cum capacity).</p> <p>iii) Two numbers of each type of Bulk chemical storage tanks of required capacity (Minimum 5 Cum capacity).</p> <p>iv) Supply of all chemicals for complete water treatment facilities for commissioning, initial operation and Six months (6) months of operation after PG test including first fill, topping requirements for all the systems as per system requirements & as specified. Chemical storage shall be designed to meet minimum 30 days requirement.</p> <p>l) GENERAL</p> <p>i) All pumps/blowers/agitators shall be equipped with electrical drives & associated accessories.</p> <p>ii) Supply of all the first fills of consumables & topping requirement of consumables such as greases, oil, lubricants etc. which will be required to put the equipment /system covered under the scope of specifications into successful commissioning, initial operation and Six months (6) months of operation after PG test.</p> <p>iii) All interconnecting piping like Process water piping/ utility (Service water/Potable water) water piping at different location of the plant, Piping related to meet the ZLD requirement and effluent disposal (if any) shall be provided. Associated piping system accessories like valves, fittings, support, process instruments etc to complete the system shall be provided.</p> <p>iv) All the fasteners like Nuts, Bolts, Washers etc. shall be of SS-316.</p> <p>v) Contractor shall provide equipment handling arrangement for various equipment (as applicable). Items weighing more than 50 kg and required to be replaced for maintenance shall be provided with manual hoists. Electric hoist shall be provided for all items requiring maintenance and weighing 500 kg or more. Hoists should be sized to handle the heaviest component to be handled with 25% margin and should comply to IS: 3938 (as applicable).</p> <p>vi) All the rotating equipment like Pumps, blowers, oil skimmer etc & UF-RO skid, chemical storage, preparation & dosing tanks etc of water treatment systems shall be located inside structural steel shed.</p> <p>vii) Required numbers of safety shower units and adequate number of Eye fountains to protect against any chemical hazard shall be provided.</p> <p>viii) Required platform, ladders etc to facilitate approach to various tanks, manholes/hand-holes, sight-glass, operation & maintenance of valves, instruments etc shall be provided.</p>		
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	<div><div><div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div></div><div>एनटीपीसी</div><div>NTPC</div></div></div> <div><p>ix) The plant will be made of high-quality materials and all components (valves, pumps, piping/fittings etc) used will be anticorrosive thus preventing damage due to saline environment.</p><p>x) The Contractor shall supply all required anchor bolts, foundation plates, sleeves, nuts, inserts etc. Each equipment skids shall be provided with suitable lifting lugs, eyebolts etc. to facilitate erection & maintenance.</p><p>xi) Any additional equipment required to make the system complete and all miscellaneous items that are necessary to ensure safe and reliable operation of the plant during start-up, continuous running, shutdown, and emergency conditions even if these are not explicitly mentioned in this specification.</p></div>												
11.02.01	<div><div><div><div></div><div></div><div></div></div><div>EQUIPMENT DESIGN/SIZING CRITERIA</div></div></div> <div><div><div><div></div><div></div><div></div></div><div>(i) Lamella clarifier/ Tube settler: -</div></div><div><p>Lamella clarifier/ Tube settler shall be preferably Skid Mounted. The overall area of the unit shall be based on an average flow velocity not more than 3 m3/m2/hr. The unit shall be designed with a minimum retention time of 90 minutes in the settling zone. Larger retention time may be provided to meet the guarantee of equipment. For tube settler, the cross-sectional area of each tube shall be such that the effective hydraulic diameter is 60 mm (min). Design of the sludge removal system should be such as to reduce loss of water during sludge blow off within 3% of rated flow. Flash mixer and Flocculation Chamber at its upstream, shall be with minimum 1-minute storage for flash mixer and 10-minute storage for flocculation chamber at the design flow rate. Sludge removal systems shall be designed to thicken the sludge to minimum 3% solid consistency.</p><p>Lamella clarifier/ Tube settler for PT Plant shall be guaranteed for design effluent capacity meeting the guaranteed effluent quality (at the outlet) as mentioned: -</p><p>Turbidity < 10.0 NTU, Organic matter < 0.05 mg/L, Iron content <0.3 mg/L</p><p>Lamella clarifier/ Tube settler for ETP shall be guaranteed for design effluent capacity meeting the guaranteed effluent quality (at the outlet) as mentioned: -</p><table><tr><td></td><td></td><td>Inlet quality</td><td>Outlet quality</td></tr><tr><td>(i)</td><td>Turbidity</td><td>500 NTU (max)</td><td>10 NTU (max)</td></tr><tr><td>(ii)</td><td>Oil content</td><td>50 ppm (max)</td><td>5 ppm (max)</td></tr></table></div><div><div><div><div></div><div></div><div></div></div><div>(ii) Thickener:</div></div><div><p>The thickener shall be capable of thickening the sludge to 7% solid consistency. Hydraulic circuit shall be such that overflow from thickener shall flow by gravity. Polyelectrolyte dosing facility required for thickening shall be provided for which necessary piping, pumps, valves etc. shall be supplied by bidder.</p></div></div></div>			Inlet quality	Outlet quality	(i)	Turbidity	500 NTU (max)	10 NTU (max)	(ii)	Oil content	50 ppm (max)	5 ppm (max)
		Inlet quality	Outlet quality										
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	<p>(iii) Belt Press:</p> <p>Selection of Belt press should be compatible with sludge and shall be capable of thickening the sludge to min. 25% solid consistency. Belt press should be equipped with machine operation flexibility by varying speed to meet changing operating conditions.</p> <p>(iv) Dual Media (DMF) Filters</p> <p>DMF shall be designed for surface flow rate of not more than 7 m/hr. Only one filter shall be backwashed at a time. Backwash water requirement not to exceed 2% of water treated between two successive backwashes. Backwashing & air scouring of filters shall be done in not less than 24 hours. Air blower shall be used for air scouring of filter bed.</p> <p>Each DMF shall be guaranteed for design capacity meeting the guaranteed effluent quality (at the outlet) as mentioned: -</p> <p>Turbidity shall not exceed 2.0 NTU with inlet turbidity of upto 10 NTU.</p>

11.02.02


UF-RO System


S.NO	PARTICULAR	DESIGN CRITERIA
1	Type of UF-RO System	UF + RO + Post-treatment, Preferably Skid Mounted
2	Net output from each train of RO Plant at design condition (Guaranteed Permeate Flow Rate)	5 m3/hr
3	Self-Cleaning Strainer	
(i)	Filtration capacity	Shall not be less than gross capacity of each train meeting the effluent quality
(ii)	Type of Strainer	Automatic type strainers
(iii)	Screen Size	~ 100–150-micron size (at inlet)
(iv)	Filter element	MOC- SS 316
4	Cartridge Filter	
(i)	Filtration capacity	Shall not be less than gross capacity of each train meeting the effluent quality
(ii)	Filtering Efficiency	95 % down to 5 microns
(iii)	Filter element	Polypropylene wound filament
7	UF System	
(i)	UF membrane	Hollow-fiber, pressurized type

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	(ii)	Design Inlet water quality	Filtered water delivered by Dual Media Filters of PT System
	(iii)	Design Capacity of UF	To suit system requirement i.e. UF Permeate Flow (Net) + water required for backwashing of UF membrane + chemical preparation requirements + any other system requirement considered by Bidder
	(iv)	Membrane material	Polyvinylidene di fluoride (PVDF) or Polyether sulfone (PES- Multi bore type)
	(v)	Gross maximum design flux rate	Not be more than 65 l/m2/h.
	(vi)	UF recovery	Not be less than 92%.
	(vii)	Pore size of membrane	Not more than 0.04 microns
	(viii)	UF permeate water storage tank	One (1) hour retention (Min)
	(ix)	Design permeate water quality	Turbidity < 1.0 NTU, SDI < 3, S&DSI<0.5, Chlorine (ppm) -Nil, pH-6.5-7.0.
	8	RO System	
	(i)	Gross Capacity of each Train RO Plant	Net Output of each Train + internal consumption of RO system + chemical preparation requirements + any other system requirement considered by Bidder
	(ii)	Guaranteed Recovery (design)	Not less than 85%
	(iii)	Average Flux (design)	25 L/M2h
	(iv)	Design Inlet Water quality	Permeate Water as received from UF system
	(v)	Design Water Temperature	Upto 32 deg C
	(vi)	Membrane type	Polyamide, Spiral wound suitable for water (non-telescopic, non-flexing and leak free)
	(vii)	Fouling Allowance for design	Minimum 10% per year
	(viii)	Salt passage increases	Minimum 15% per year
	(ix)	Design Effluent water quality	TDS < 30 ppm
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11.02.03	<p>(i) Pumps/Blower: -</p> <p>All the pumps/Blowers shall be designed with head as per system requirement considering minimum water level +10% margin in frictional head loss.</p> <p>(ii) Tanks/Sump -</p> <p>a. Capacity of tank/sump (if not specified in specification): Min 30-minute retention time of system requirement.</p> <p>b. All tanks/sump shall be equipped with associated accessories (as applicable) like Manhole, Staircase, Platform, Vent, Drain, Overflow line, Hand railing on the roof of tank all around (as applicable), connections for instruments, required flanges (as applicable) etc.</p> <p>(iii) Potable water system shall meet the drinking water required for all the plant facilities/buildings.</p>																																																													
11.03.00	Data Sheet																																																													
	<table><tr><th>SI No</th><th>System/ Equipment</th><th>Qty</th><th colspan="2">Technical Parameter</th></tr><tr><td>01</td><td colspan="4">Raw Water System</td></tr><tr><td>(i)</td><td>Raw Water tank /Sump</td><td>One (Twin section)</td><td>Capacity-15 Cum of each section</td><td>RCC with PU Coating (Overground/ Underground)</td></tr><tr><td>(ii)</td><td>Raw Water Transfer pump</td><td>Two (1W+1S)</td><td>Capacity of each pump 25 Cu.m/hr</td><td>Horizontal Centrifugal pump</td></tr><tr><td>(iii)</td><td>Raw Water Pumps</td><td>Two (1W+1S)</td><td>Capacity of each pump- 12 Cum/hr</td><td>Horizontal Centrifugal pump</td></tr><tr><td>02</td><td colspan="4">Pre-Treatment (PT) Plant</td></tr><tr><td>(i)</td><td>Tube Settler or Lamella Clarifier</td><td>1x100%</td><td>Design inlet flow - 12 Cum/hr + 3% for sludge + 5% margin over the above total requirement.</td><td>Overground</td></tr><tr><td>(ii)</td><td>Clarified Water Tank</td><td>One (Twin section)</td><td>Usable Capacity-60 Cum each section</td><td>FRP (Overground)</td></tr><tr><td>(iii)</td><td>Common Sludge Pit</td><td>One (Twin section)</td><td>Usable Capacity - To store the total sludge generation from all clarifiers/tube settlers of water system area (considering round the clock operation) With 5% margin over the above total requirement. (Min 6 Cum each section)</td><td>RCC with PU Coating (Underground)</td></tr><tr><td>(iv)</td><td>Sludge Transfer Pump</td><td>Two (1W+1S)</td><td>Capacity of each pump- designed to empty the complete sludge pit in 8 hr.</td><td>Horizontal Centrifugal/ Submersible pump</td></tr><tr><td>(v)</td><td>Sludge Thickener</td><td>1x100%</td><td>Design Capacity- Same as each Sludge Transfer pump capacity (Min.)</td><td>FRP/ MSRL (Overground)</td></tr><tr><td>(vi)</td><td>Belt press</td><td>Two</td><td>Capacity of each pump-</td><td>Screw pump</td></tr></table>	SI No	System/ Equipment	Qty	Technical Parameter		01	Raw Water System				(i)	Raw Water tank /Sump	One (Twin section)	Capacity-15 Cum of each section	RCC with PU Coating (Overground/ Underground)	(ii)	Raw Water Transfer pump	Two (1W+1S)	Capacity of each pump 25 Cu.m/hr	Horizontal Centrifugal pump	(iii)	Raw Water Pumps	Two (1W+1S)	Capacity of each pump- 12 Cum/hr	Horizontal Centrifugal pump	02	Pre-Treatment (PT) Plant				(i)	Tube Settler or Lamella Clarifier	1x100%	Design inlet flow - 12 Cum/hr + 3% for sludge + 5% margin over the above total requirement.	Overground	(ii)	Clarified Water Tank	One (Twin section)	Usable Capacity-60 Cum each section	FRP (Overground)	(iii)	Common Sludge Pit	One (Twin section)	Usable Capacity - To store the total sludge generation from all clarifiers/tube settlers of water system area (considering round the clock operation) With 5% margin over the above total requirement. (Min 6 Cum each section)	RCC with PU Coating (Underground)	(iv)	Sludge Transfer Pump	Two (1W+1S)	Capacity of each pump- designed to empty the complete sludge pit in 8 hr.	Horizontal Centrifugal/ Submersible pump	(v)	Sludge Thickener	1x100%	Design Capacity- Same as each Sludge Transfer pump capacity (Min.)	FRP/ MSRL (Overground)	(vi)	Belt press	Two	Capacity of each pump-	Screw pump	
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		feed Pump	(1W+1S)	designed to empty the complete sludge pit in 8 hr.	
	(vii)	Belt press	2x100%	Feed Capacity- Same as Thickened sludge generation capacity/hr from Thickener, Min Capacity-1.5 Cum/hr	As Per Mfg Std.
	(viii)	Sludge Water Sump	One	Usable Capacity-5 Cum (Min)	FRP (Overground)
	(ix)	Sludge water transfer Pumps	Two (1W+1S)	Capacity of each pump- Min 3 Cum/hr.	Horizontal Centrifugal pump
	03 Dual Media Filter				
	(i)	Filter feed pump	Two (1W+1S)	Capacity of each pump- Same as net output capacity of Tube Settler or Lamella Clarifier	Horizontal Centrifugal pump
	(ii)	Dual Media Filter	2x100%	Filtration Capacity- Same as each Filter feed pump capacity	FRP/ MSRL
	(iii)	DMF Back wash pump	Two (1W+1S)	Capacity of each pump- As per System requirement.	Horizontal Centrifugal Pump
	(iv)	Filter water Tank	One (Twin section)	Usable Capacity-200 Cum each section	FRP (Overground)
	(v)	UF Feed Pump	Two (1W+1S)	Capacity of each pump- As per System requirement.	Horizontal Centrifugal Pump
	04 Service water System				
	(i)	Service water Storage Tank	One (Twin section)	Usable Capacity-50 Cum each section	FRP (Overground)
	(ii)	Service water Pumps	Two (1W+1S)	Capacity of each pump- As per System requirement. Min – 6 Cum/hr.	Horizontal Centrifugal Pump
	(iii)	Belt Cleaning Pumps	Two (1W+1S)	Capacity of each pump- As per System requirement	Horizontal Centrifugal Pump
	05 Potable water System				
	(i)	Potable water Tank	One (Twin section)	Usable Capacity-5 Cum each section,	FRP (Roof mounted Overhead tank)
	(ii)	Potable water Pumps	Two (1W+1S)	Capacity of each pump- As per System requirement. Min – 5 Cum/hr.	Horizontal Centrifugal Pump
	06 Effluent Treatment Plant (ETP)				
	(i)	Waste Water Collection Sump	One	Usable Capacity-75 Cum	RCC with PU Coating (Underground)
	(ii)	Waste Water	Two (1W+1S)	Capacity of each pump-To meet the ETP Tube Settler or	Horizontal Centrifugal
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		transfer pump		Lamella Clarifier requirement	Pump
	(iii)	Tube Settler or Lamella Clarifier	1x100%	Design inlet inflow - 12 Cum/hr + 3% for sludge with 5% margin over the above total requirement.	FRP
	(iv)	CMB	One	Usable Capacity-40 Cum each section	RCC with PU Coating (underground)
	(v)	Treated Water transfer pump	Two (1W+1S)	Capacity of each pump- designed to empty the CMB in 4 hr.	Horizontal Centrifugal Pump
	(vi)	Oil water collection sump	One	Usable Capacity-8 Cum	RCC with PU Coating (Underground)
	(vii)	Belt Oil skimmer	Two (1W+1S)	Capacity-As per System Requirement, Min Capacity-20 LPH	As per Mfg. Standard
	(viii)	Oily Effluent transfer pump	Two (1W+1S)	Capacity of each pump- designed to empty the pit in 4 hr. Head- As per requirement	Horizontal Centrifugal Pump
	(ix)	Oil Water Separator	Two (1W+1S)	Capacity-As per System Requirement, Min Capacity-10 Cum/hr	As per Mfg. Standard
	07	RO Reject System			
	(i)	RO Reject Collection Sump	One	Usable Capacity-8 Cum (Min)	MOC- RCC with PU Coating (Underground)
	(ii)	RO Reject water transfer pump	Two (1W+1S)	Capacity-As per System Requirement, Min Capacity-5 Cum/hr	Horizontal Centrifugal Pump
	(iii)	Horticulture / irrigation water pumps	Two (1W+1S)	Same capacity as that of RO reject water transfer pump	Horizontal Centrifugal Pump
	(iv)	Sea water pumps	Two (1W+1S)	Same capacity as that of RO reject water transfer pump	Horizontal Centrifugal Pump
	08	Air Blower System (Wherever required)			
		Air Blowers	Two (1W+1S)	Capacity-As per System Requirement with 5% margin over the above total requirement. Head as per system requirement	As per Mfg. Standard
	09	Miscellaneous			
	(i)	Sump pumps	5 Nos	Each of 25 Cu.m/hr & 50 mWC	Potable type submersible pumps

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12.00.00	PLANT AUXILIARY SYSTEMS			
12.01.00	COMPRESSED AIR SYSTEM FOR INSTRUMENT & SERVICE AIR APPLICATION <ol style="list-style-type: none"> a) Two (2) numbers (2x100%) oil free, rotary screw type air cooled air compressors for instrument air and service air applications for complete plant each of adequate capacity & adequate pressure, with their motor drives and other accessories as per equipment sizing criteria mentioned in Volume-IV (Plant Performance & Design Philosophy), Part-A of Technical Specification. However, minimum capacity of each air compressor shall be 5 Nm³/min at discharge pressure of 8.0 Kg/cm² (g). b) Two (2) numbers (2x100%) air-cooled Air-Drying Plants (one for each air compressor) of adequate capacity with all interconnecting piping, valves, fittings, etc. c) Two (2) numbers of Air Receiver of minimum capacity 2 m³ (one at the discharge of each Air compressor). d) Complete instruments, control system with panels as required for compressor e) Any additional items required to make the system complete. f) For detailed specification of Compressed air system and selection of the required capacity and discharge pressure of Air compressors, please refer Part-B of technical Specification. 			
12.02.00	FIRE DETECTION AND PROTECTION SYSTEM <p>The fire detection and protection system shall consist of:</p> <ol style="list-style-type: none"> a) Fire Water Pumping System Complete fire water pumping system consisting of two (2) nos. fire water storage tank, fire water pumps & drives (common for hydrant system and spray system), batteries and battery chargers for the diesel engines drives, automatic pressurization system consisting of electric motor driven jockey pumps, required instruments, controls, and panels as per the detailed specifications in Part-B of technical specification. b) Hydrant System Hydrant system shall consist of network of piping, hydrant valves, internal hydrants/landing valves, water monitors, isolation gate valves, etc. and associated civil work for complete power plant covering main plant building, switchyard, transformer area, all pump houses, Admin Building, Canteen Building and various miscellaneous buildings of the plant, etc. in the scope of the Bidder, as per the detailed specifications in Part-B of technical specification. c) HVW Spray System Automatic fire detection cum high velocity water spray system for various transformers/reactors of rating 10MVA/10MVAR & above, lube oil tanks and purification unit, feed pumps of lube oil system, etc. in the scope of the Bidder, as per the detailed specifications in Part-B of technical specification. d) MVW Spray System 			
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	<div><div><div>Automatic fire detection cum medium velocity water spray system for the various cable galleries, DG set fuel oil tanks, etc. in the scope of the Bidder, as per the detailed specifications in Part-B of technical specification.</div><div><div>e)</div><div>Inert Gas Extinguishing System</div><div>Automatic gaseous fire extinguishing system using inert gas agent as per NFPA-2001 for control room, control equipment rooms and associated C&I rooms like programmer/server rooms, panel room, UPS/Battery charger rooms of main plant building as per the detailed specifications in Part-B of technical specification.</div></div><div><div>f)</div><div>Control System for Fire Detection & Protection</div><div>Fire detection & protection control system shall consist of PLC based control system, analogue addressable fire alarm system consisting of fire alarm panels, repeater panel, various types of fire detectors, control cabling, centralized monitoring station etc.</div></div></div><div>PLC based control panels<div>Dual processor PLC based control system with two OWS and one A4 size color Laser printer for fire water pumps and associated systems located in fire water pump house.</div></div><div>FireAlarm System<div>Bidder to provide fire detection system as described below:</div><div><div><div>(i)</div><div>Addressable fire alarm panels shall be provided in main control room and shall include but not be limited to the following elements:<div>Analog Addressable Fire Detection and Alarm System panels with Master processor module, monitoring modules, supervisory control modules, input/output modules, auxiliary relay modules, network modules and Power supply system (batteries and battery chargers, suitable for providing battery backup of 24 hours (stand by) and 30 minutes (in alarm conditions), etc</div></div><div>Fire alarm panels shall be interconnected with each other & repeater panel and with PLC panel of fire water pump house such that information related to fire alarm system can be viewed from any panel.</div></div><div><div>(ii)</div><div>Centralized PC based monitoring station along with mini-UPS and one A4 size color laser printer shall be provided for main control room. It shall serve the purpose of Central PC Station with facility of monitoring information related to all fire alarm system and of operating drives of fire water pump house</div></div><div><div>(iii)</div><div>One number addressable type repeater annunciation panel in central fire station with power supply system (batteries and battery chargers, suitable for providing battery backup of 24 hours (stand by) and 30 minutes (in alarm conditions), etc.</div></div><div><div>(iv)</div><div>Software and hardware as required to provide a complete functioning of the system</div></div><div><div>(v)</div><div>Fire alarm panels shall provide contacts to CCTV, air conditioning system and ventilation system of engine hall for initiating control functions like shutdown of fans/air conditioning equipment, tripping of transformers, etc. Details for the same shall be finalized during detail engineering.</div></div><div><div>(vi)</div><div>Fire detection & protection system shall have the provision for future interconnection with Employer's LAN/WAN preferably from a single point.</div></div><div><div>(vii)</div><div>Short term fireproof cable shall be used for inert gas protected areas as follows:</div></div></div></div></div> <div><div>GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE</div><div>TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2</div><div>VOLUME III SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS</div><div>Page 16 of 95</div></div>

Detector to detector / isolator/interface unit and detector/ interface/ isolator unit to JB.

Detector cables outside the building shall be corrugated steel taped armored laid through cable trays wherever available and for rest of the areas, cable shall be buried at 600 mm depth with sand filling and brick covering at the top.

Detector cable within the building shall be unarmored & laid through GI conduits to prevent damage.

Remote manual operation of the deluge valves shall be possible from the fire alarm control panel through the keyboard operation of PC monitoring station when the system is selected in remote manual mode.

Power Supply System

The DC Power Supply system shall consist of the following system(s):

- i) 24 V DC power supply system for each PLC based control system shall comprise of two sets, each set shall consist of 1x100% microprocessor controlled, intelligent, modular rectifier banks, Controller – one for each rectifier bank, 1x100% Nickel - Cadmium batteries for one (1) hour duty, 1x100% DC distribution board and 1x100% Microprocessor controlled Battery Health Monitoring System (BHMS)–common for both the sets.
- ii) One set of 24 V DC power supply system comprising of 2x100% Chargers and 1x100% batteries for each fire alarm panel and repeater alarm panel with battery backup of 24 hours (standby) and 30 minutes (in alarm conditions).

For detailed specification of power supply system, please refer Part-B of technical Specification.


g) Fire Extinguishers


- i) Fire extinguishers shall be installed in all the buildings within plant boundary as per TAC requirement.
- ii) The Contractor shall supply the following minimum quantities of fire extinguishers and install the same at various locations. However, the actual quantity shall be as per TAC requirement.

1.	Portable type:	
	Pressurized water type (9 lit. cap.) (IS:15683 operated by CO2 cartridge type)	25 Nos.
	Foam type (9 lit. cap. IS: 15683)	25 Nos.
	CO2 type (4.5 kg. Cap. IS: 15683)	25 Nos.
	Dry Chemical powder (6 kg. Cap. IS: 15683)	40 Nos.
2.	Mobile type:	
	Foam type (60 lit. cap. IS: 16018)	1 Nos.
	CO2 type (22.5 kg. Cap. IS: 16018)	4 Nos.
	Dry Chemical powder (50 kg. Cap. IS: 16018)	4 Nos.

h) Fire Tenders and Fire Station Equipment


Fire station building shall be equipped with all the equipment as required for efficient operation of the fire squad. The scope of equipment includes but not limited to the followings:

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13.00.00	<p>i. One number fire water tender, Type-B for fire brigade use as per IS:950 with all accessories listed in IS.</p> <p>ii. One no. foam tender with all accessories as per IS: 10460 and its appendices</p> <p>iii. One no. fire jeep with trailer pumps and with all accessories as per IS: 944 and its appendices.</p> <p>iv. Four (04) Nos. of fire suits as per relevant IS code.</p> <p>v. Ten (10) Nos. of breathing apparatus as per relevant IS code.</p> <p>vi. Two sets of first aid kits as per relevant IS code</p> <p>vii. Two sets of telescopic ladders as per relevant IS code.</p> <p>viii. Ten (10) sets of fiber glass blankets as per relevant IS code</p> <p>ix. Four (4) nos. multi-purpose nozzles</p> <p>x. One (1) no. portable thermal imaging camera.</p> <p>For detailed specification of fire tender and fire station equipment, please refer Annexure-III, Chapter M4, Volume-I, Part B of technical Specification.</p> <p>i) One (1) number monorail electric hoist of minimum two (2) ton capacity for fire water pump house.</p> <p>j) All pylons required for transformers, reactors, etc. shall be anchored to soak pit base slab of individual transformer, paved area outside soak pit, etc. using anchor fasteners of adequate capacity. Subsequent to fixing the pylons, lower part of pylon which would be within filled up gravel portion shall be encased with concrete by Contractor for corrosion protection.</p> <p>k) Grouting, dressing and final finishing of all foundations of various equipment, etc.</p> <p>l) Supply of structural supports for piping in trench (as required) and for above ground piping wherever applicable.</p> <p>m) Supply and erection of all bolts, foundation bolts, nuts, gaskets, packing, hangers support clamps, and all accessories required to complete erection, and commissioning shall be in bidder's scope. Inserts/embedment required for all pipes running over-ground on pedestal and in trenches, etc. shall be provided by bidder. All clamps, channels bolts nuts, etc. to support/mount piping with trestle/structure shall be supplied and erected by the contractor. All inserts to be embedded in concrete required for equipment foundation (pump/engine/fuel oil tank, etc.) shall be in bidder's scope.</p> <p>n) Acoustic enclosure (if required) for diesel engines of fire water pumps shall also be provided by the Contractor to limit the noise level as specified.</p> <p>NOTE: Bidder to refer Annexure-II, Chapter M4, Volume-I, Part-B of technical specification for major Technical Data.</p>	
	<p>AIR CONDITIONING SYSTEM</p> <p>a) General</p> <p>Complete Air conditioning system consisting of Packaged air conditioner, ductable split air conditioners, Non-ductable Split (Hi-wall/Cassette) air conditioners, air distribution system (ducting, filters, piping, valves, isolation dampers, motorized fire dampers, diffusers, grills, etc.), pan humidifier, heater, etc., along with all electrical equipment and instrumentation as required for all the buildings which are in the scope of the bidder, as detailed out in Part-B of technical specification.</p> <p>b) Air Conditioning System for Main Plant Control Room Building:</p> <p>2x100% Packaged Air conditioners (ductable type) shall be provided for control room, panel room, etc. in main control room building.</p>	
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14.00.00	<p>c) Air Conditioning System for Administrative Building: 2x50% Packaged Air conditioners (ductable type) shall be provided for Administrative building.</p> <p>d) Air Conditioning System for Canteen Building: 2x50% Packaged Air conditioners (ductable type) shall be provided for Canteen building.</p> <p>e) Ductable/Non-Ductable (Hi-Wall/Cassette) Split Air-conditioners: Ductable/Non-ductable (Hi-Wall/Cassette) split air conditioners shall be provided for auxiliary control rooms, RIO rooms, VFD rooms, office areas, etc. of various buildings covered under bidder's scope.</p> <p>f) Any additional items required to make the air conditioning system complete.</p> <p>g) For Air conditioning system, the Contractor shall provide all Instrumentation systems, accessories and associated equipment, which are included in Contractor's scope, in a fully operational condition. The Contractor shall also provide all material, equipment and services which may not be specifically stated in the specifications but are required for completeness of the equipment/systems furnished by the Contractor and for meeting the intent and requirements of these specifications.</p>	
	<p>VENTILATION SYSTEM</p> <p>a) General</p> <p>Complete ventilation system consisting of supply air fans, roof extractors, exhaust air fans, louvers, filters, back draft dampers, etc. for all the buildings/areas, etc. which are in the scope of the bidder, as detailed out in Part-B of technical specification.</p> <p>b) Main Plant building and associated areas</p> <p>The main engine/machine hall shall be ventilated by a combination of roof extractor fans and supply air fans fitted with pre filter & fine filter.</p> <p>c) All other areas like GIS hall, MCC/Switchgear Rooms, pump houses, cable vaults/galleries, stores, pantry, workshop, toilets, etc. covered under Bidder's scope shall be ventilated by a combination of 'supply air fans & roof exhauster fans' or 'supply air fans & exhaust fan's or 'supply air fans & back draft dampers' or 'fresh air in-take louvers & exhaust air fans'. For ventilation of battery rooms and oil rooms, flame proof motor shall be used. Further, toilets shall be provided with propeller type exhaust air fans.</p> <p>d) Any additional items required to make the system complete.</p> <p>e) For Ventilation system, the Contractor shall provide all Instrumentation systems, accessories and associated equipment, which are included in Contractor's scope, in a fully operational condition. The Contractor shall also provide all material, equipment and services which may not be specifically stated in the specifications but are required for completeness of the equipment/systems furnished by the Contractor and for meeting the intent and requirements of these specifications.</p>	
	<p>15.00.00 ELEVATOR, CRANES AND HOISTS ETC.</p>	
	<p>15.01.00 EOT Cranes</p> <p>Required numbers of Electric Overhead travelling (EOT) type cranes for various areas/ buildings as specified in other sections of this volume & Part-B, Section-VI of Technical Specification.</p>	
	<p>15.02.00 Monorail Hoists</p>	
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	<div>Required numbers of monorail hoists along with its supports for handling of various equipment of pump houses, various pumps and motors in pump houses, compressed air system etc. as specified in Part-B, Section-VI of Technical Specification.</div> <div>Requirement of EOT Cranes and Hoists as mentioned above is only indicative and bidder to provide lifting arrangement in all areas as required.</div> <div>15.03.00 Passenger Elevators</div> <div>The Passenger elevators for Common control room/ Utility building shall be as under.</div> <div><div>(i) 01 nos. conventional type elevator having capacity of 6 persons (408 kg.)</div><div>(ii) The scope shall include all items / accessories, service along with all electrical equipment etc. required to meet all design, installation, operation, safety, protection and other requirements of IS:14665 (latest edition) (all parts). This scope shall include all items / devices needed to comply with the requirements indicated elsewhere in the specification. The scope shall include but not limited to the following:<div><div>a) 1 No. fireman's switch for each elevator.</div><div>b) Machinery supporting Beam.</div></div></div><div>(iii) Complete erection, testing and commissioning including all testing and commissioning materials, consumables and other tools and tackles required for erection</div><div>(iv) To obtain necessary local administration permits /approvals and make arrangements for inspection and tests required thereby.</div></div> <div>15.04.00 Hydraulic Crane , Battery Operated trolley & Forklift</div> <div>Bidder shall supply 1 (one) no. 15 Ton capacity hydraulic crane, 2 (two) no. min. 3 Tons capacity medium size multipurpose battery-operated trolley and 2 (two) no. min. 1 Ton capacity Forklift.</div> <div>Design of Crane, Trolley & Forklift shall be in line with relevant standards and codes, details of which shall be finalized during the detail engineering.</div>		
16.00.00	CONTROL AND INSTRUMENTATION SYSTEM		
16.01.00	GENERAL		
	<div>a) The Contractor shall be responsible for design, material procurement, fabrication, programming, testing, packing, unloading, storage, shipping, installation & commissioning of a complete PLC based control system for the Gas Engines, Common and electrical systems with all related services in accordance with intent and requirements of the specification.. The Contractor shall provide all systems, equipment, accessories and associated equipment, which are included in Contractor's scope, in a fully operational condition acceptable to the Employer. The Contractor shall provide all material, equipment and services so as to make a totally integrated Instrumentation and Control System together with all accessories, auxiliaries and associated equipments ensuring</div>		
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	<div><div><div>operability, maintainability and reliability. The work shall be consistent with modern power plant practices and shall be in compliance with all applicable codes, standards, guidelines and safety requirements in force on the date of award of the contract. The requirements of statutory Authorities (e.g. MOEF, Inspector of Factories, IBR, TAC, CPCB/SPCB/CERC etc with regard to various plant areas like main plant, Fuel Gas Plant/System, Chlorinating Plant, Water treatment system, Fire fighting system, Emission measurements etc.) shall be complied even if not actually spelt out.</div><div><div>b)</div><div>The Contractor shall provide all material, equipment and services which may not be specifically stated in the specifications but are required for completeness of the equipment/systems furnished by the Contractor and for meeting the intent and requirements of these specifications. The work shall be consistent with modern Gas Engine based power plant practices and shall be in compliance with all applicable codes, standards, guidelines and safety requirements in force on the date of award of the contract.</div></div><div><div>c)</div><div>The Contractor shall also provide all the instruments along with cables, JB etc. for equipments / drives and services which may not be specifically stated in this specifications but are required for completeness of the Control system shall be furnished by the Contractor and for meeting the intent and requirements of these specifications. All instruments/ equipments etc. shall be suitable for highly corrosive environment prevalent in the coastal area. For coastal areas, all instruments/ equipments shall be provided with durable epoxy/ polyurethane coating for housings and all exposed surfaces of all instruments/ equipments.</div></div><div><div>d)</div><div>The Contractor scope shall include design, manufacture, engineering, inspection & testing at supplier's works, packing, forwarding to site, unloading, erection, testing & commissioning. The following clauses describe the brief scope of supplies. It is intended to provide the brief scope only, any other equipment/system required for ensuring the safe, reliable and trouble free operation of the plant under the present scope of the work shall be provided within the lump sum quoted price of the contract. The detailed technical specifications are stipulated under Part - B, of the specification including all annexure, appendixes etc. However, Contractor to ensure the functionality & operability of the complete system in all regimes of operation.</div></div><div><div>e)</div><div>All other special instruments/ equipments for which specifications are not provided in Part-B, of technical specifications shall be provided as on required basis as per OEM Standard & Proven practice. Contractor's offering as per his "standard and proven practice" shall be accepted based on the documentary evidence</div></div></div><div><div>The detailed technical specifications are stipulated under Part - B, Section-VI of the specification as well as in various other Parts of the Technical Specifications</div></div></div>		
16.02.00	MEASURING INSTRUMENTS		
16.02.01	Primary instruments like Microprocessor based transmitters employing HART protocol, thermocouples & RTDs along with temperature transmitters, pressure/diff. pressure/temperature/flow transmitter & gauges, flow sensing elements (orifice plates, flow nozzles etc.), Radar type level transmitters, Gas leak detectors, Fuel Gas flowmeter etc. to be provided on as required basis complying the specification requirement specified in Part B. All the instruments shall be provided to meet the actual system requirements and meeting		
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16.03.00	redundancy and other requirements specified under technical specifications, as per OEM practice, subject to Employer's approval.			
	<p>CONTROL SYSTEM</p> <p>The Contractor shall provide PROGRAMMABLE LOGIC CONTROLLER (PLC) based control system for Gas Engines as well as for Common and Electrical System Controls. The Control System shall be able to perform automatic sequential start up, run-up, synchronization, loading, unloading and shutdown operation of Gas Engines in safe and efficient manner under all regimes of operation. This shall include auto operation of various auxiliaries/ sub systems like lube oil system, cooling water system, etc. In case Contractor offers DDCMIS in place of PLC based Control system, the same shall be acceptable.</p> <p>Gas Engine shall be provided with a governing system including speed and load controllers with frequency-droop correction for regulating the fuel flow into the engine. The control system shall be designed for operation as detailed under this technical specification. Other controls which are necessary, and as per the Gas Engine supplier's recommendations are also envisaged.</p> <p>Automatic Startup and Shutdown Sequencing System shall be provided including all required interlocks, sequence logic and modulating control loops for safe and efficient startup/ shutdown of the Gas Engine.</p> <p>Three number of Operator Workstation (OWS) and A4 size color Laser printer for controlling and monitoring of the Gas Engines and associated system shall be provided and the same shall be located in Central Control Room. Instrumentation and Control System with interlocks, protection and annunciation for the complete system being provided under the contract shall be provided with all required software and hardware to make the system complete and functional. Additionally, two workstations shall also be provided with capabilities of programming station and historian capability to store at least 2 year of historical data of PLC system (EWS cum OWS). Essential cyber security provisions shall also be provided as per the contractor's standard and proven practice for ensuring secure and reliable operation of the complete system in compliance to latest cyber security guidelines/regulation.</p> <p>Depending on the cable distance between Central control room and other sub systems, requirement of Remote Input Output (RIO) shall be finalized during detail engineering, in such cases, contractor to provide RIO on as required basis. Contractor shall place RIO cabinets inside RIO rooms with air conditioning environment or else RIO panels shall be provided with panel mounted ACs. RIO rooms, Air conditioning, power supply for RIO cabinets shall be in contractor's scope.</p> <p>For control system of Gas Engine and Genset, OEM standard and proven practice shall be acceptable. However, detailed scheme and architecture finalization shall be subject to Employer's approval</p>			
16.04.00	Other Systems			
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	<div>Other Systems like CEMS, AAQMS, UPS power supply, PCP, Instrumentation cables, power & control cables, Optical fiber cables, Junction boxes, Conduits, Cable sub trays, Control valves, Electric Actuators, Master & Slave clock system, CCTV, PA system, Walkie Talkie and C&I lab shall be provided on as required basis/ minimum quantity as specified in Part B for complete plant, meeting requirements specified in Part B Chapter III C of specifications.</div>		
16.05.00	<div>Central Control Room</div> <div>An air-conditioned Central Control Room of adequate size housing the PLC based control system panels, Control desk, OWS, UPS, Battery etc. shall be provided by the contractor. The Control room shall be aesthetically designed offering a complete view of the engine hall to the operators at all time. Temperature & Humidity of Control room/ RIO room (if any) shall be continuously monitored. Battery shall be located in an air ventilated area inside the Control Room. The final design of the Control Room shall be finalized during detailed engineering.</div>		
17.00.00	<div>ELECTRICAL SYSTEMS</div> <div>SCOPE</div> <div>The Bidder scope shall include design, engineering, manufacture, type testing, inspection & shop testing at supplier's works, packing, forwarding to site including customs clearance/ port clearance (if required), receipt and unloading, in plant transportation, handling and storage (preservation & conservation of equipment) at site, erection including associated civil and structural works, testing and commissioning of the Electrical equipment/ system and works as indicated in this chapter. The Electrical scope shall be as described briefly in the following clauses but not limited to it.</div> <div>The Bidder's scope includes complete electrical system of EPC package including but not limited to the following.</div> <div><div>i) System design including Key SLD.</div><div>ii) Equipment sizing and design calculation</div><div>iii) Cable route layout and interference design</div><div>iv) Preparation of power and control cable listings and interconnection schedule</div><div>v) Design of lighting, earthing & lightning protection systems</div><div>vi) Design of 132kV and 33kV switchyard (GIS) including protection and control and its interconnection through Tie Transformer.</div><div>vii) Design for switchgear buildings, control buildings and others.</div><div>viii) Design and sizing for complete DC system.</div></div> <div>The Design calculations shall include transient study and protection coordination of the entire offered system.</div>		
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17.01.00	Generator and Auxiliary System 17.01.01 Generator complete in all respects including stator, rotor, bearings, couplings, terminal pads with palms and all its associated supervisory and instrumentation system. 17.01.02 Complete cooling system as applicable including the necessary piping and pipe supports, valves, measuring system along with the control panel. 17.01.03 Complete excitation system (brushless or static type) with exciter, thyristors, rectifiers and filters, field flashing and field forcing equipment, rotating diodes etc. as applicable along with AVR, de-excitation equipment, cables and all necessary control, annunciation and monitoring equipment mounted on suitable panels			
17.02.00	MV Busduct a) Medium Voltage Busduct and Auxiliary equipment for connection of Generator-to-Generator Transformers. The standard equipment ratings have been specified in the relevant chapters of Part-B			
17.03.00	Transformers			
	S. No	Equipment Name	Rating/Parameters	Quantity
	1.	POWER TRANSFORMERS / REACTORS / AUXILIARY OIL FILLED TRANSFORMERS		
	i)	Generator Transformer	as per SLD & System Requirement	No. of Units+1 spare
	ii)	Tie transformer	132/33kV, 50MVA	3
	ii)	Auxiliary Transformers (including LT Outdoor)	as per SLD & System Requirement	
	iii)	INDOOR Transformers (Epoxy cast resin/ resin encapsulated)	as per SLD & System Requirement	
	2.	TRANSFORMER MAINTENANCE TESTING & MONITORING EQUIPMENTS	Refer Transformer Sub-Section, Part-B of Technical Specifications	
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	S. No	Equipment Name	Rating/Parameters	Quantity
	3.	SPARE OIL	Refer Transformer Sub-Section, Part-B of Technical Specifications	5% of total Volume for all Transformers & Reactor
17.04.00	SWITCHGEAR			
17.04.01	NOT USED			
17.04.02	LV SWITCHGEARS AND LV BUSDUCTS			
	<p>The preferred standard Transformers ratings shall be as indicated in a typical key single line diagrams Drgs. No 6401-999-POE-J-001.</p> <p>The scope of work includes the following for feeding all the LV Loads of the power plant as required (a typical key single line diagram for Aux Power Supply Drawing No. 6401-999-POE-J-001 enclosed). The design and sizing criteria of the Switchboards shall be as detailed in part B of the specifications. The major LT Switchgear shall include the following:</p> <p>415 Volt Switchgears</p> <p>415 Volt Motor Control Centers</p> <p>415 Volt AC Distribution Boards</p> <p>220 V DC Distribution Boards</p> <p>415 Volt AC MCCB Boards</p> <p>220 Volt DC MCCB Boards</p> <p>MLDB and WLDB</p> <p>Local Motor Starters for Ventilation fans, Local Push Button Stations for all motors except for ventilation fans, Telescopic Trolley for Breaker Handling, Welding / Lighting Transformers</p> <p>LV Bus ducts and associated support structure</p> <p>Sandwich Busduct and Support Structure</p>			
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17.05.00	<p>Spares (MCCB Modules less than 100 A and MPCB Modules): All Switchgears, Motor Control Centres (MCCs) & AC/DC distribution boards, etc. shall have at least twenty per cent (20%) or minimum two (whichever is higher) fully equipped MCCB/MPCB modules of each rating as spares which shall be uniformly distributed over different vertical sections.</p> <p>Spares (MCCB modules—100A and higher—Starter/DAE-OG/DM Modules): In addition, all Switchgears, MCCs and AC distribution boards shall have as spares at least twenty per cent (20%) of starter modules/MCCB/DAE-OG/DM modules or at least one module (whichever is higher) of each rating range of the selection table, equipped for the rating of the largest auxiliary fed from that range.</p> <p>Contractor's scope also includes the Insulating mat for laying in front of LT Switchgears in switchgear rooms.</p> <p>LV switchgear shall have communicable Numerical Relays (with IEC 61850) in all LV Switchgears. Sufficient number of Ethernet switches, Cat5e Ethernet cable / FO cable for connection of Numerical Relays to Ethernet switches in all Switchgears, Optical Fibre Cable with fire-retardant outer sheath as required for the complete numerical relay network and Optical Fibre Cable termination equipment such as LIU, patch cord, etc. for the complete network are also in bidders scope.</p> <p>LV switchgear shall be controlled from Plant DCS/SCADA.</p>			
	<p>DC System</p> <p>Battery and Battery Charger</p> <p>Lead acid plante type/ Nickel Cadmium batteries and Float cum boost chargers for plant and all other areas is in the scope of the contractor, as per system requirement.</p> <p>A separate DC system (other than that for main plant area) shall be provided for 132kV and 33kV GIS switchyard.</p> <p>The DC systems (Battery and Charger) shall be supplied to cater to various DC loads in the plant. The design and sizing criteria shall be as detailed out in Part-B of Technical specifications.</p> <p>One set of variable metallic resistor and shunt for each battery rating & location suitable for carrying out the discharge test on the batteries under Contractor's scope shall also be supplied</p>			
	<p>MOTORS</p> <p>Motors along with couplings and coupling guards for all rotating auxiliaries covered under this package.</p>			
	<p>Cabling</p>			
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	<div><div><div></div><div>एन टी सी</div><div>NTPC</div></div></div> <p>Following shall be in the scope of the contractor for the complete plant, building, equipment and systems etc. including interplant areas.</p> <div><div>(a.)</div><div>Supply and installation of Laying of HT power, LT power and control cables.</div></div> <div><div>(b.)</div><div>Supply and installation of Cable trays, fittings and their accessories, along with support system.</div></div> <div><div>(c.)</div><div>Supply and installation of Cable glands and lugs.</div></div> <div><div>(d.)</div><div>Supply and installation of Straight-through jointing kits for, HT XLPE power cable, LT power and control cables.</div></div> <div><div>(e.)</div><div>Supply and installation of Cable termination kits for, HT XLPE power cables.</div></div> <div><div>(f.)</div><div>Supply and installation of Welding receptacles.</div></div> <div><div>(g.)</div><div>Supply and installation of Trefoil cable clamps.</div></div> <div><div>(h.)</div><div>Supply and installation of Junction boxes.</div></div> <div><div>(i.)</div><div>Supply and installation of Galvanized steel pipes/ HDPE/ Hume pipes/ PVC pipes</div></div> <div><div>(j.)</div><div>Supply and installation of Miscellaneous items like M.S. sections etc. as required</div></div> <div><div>(k.)</div><div>Supply and installation of Fireproof cable penetration sealing system of Type-A and Type-B for cable galleries, cable exits etc.</div></div> <div><div>(l.)</div><div>The Contractor shall provide complete detailed cable tray layout drawings for contractor scope of area. The cable tray layout comprises of sufficient/exact number of cable trays, size, elevation, distances, clear view, sectional detail, cable tray numbering etc. as per the contractor equipment of Electrical/C&I loads etc.</div></div> <div><div>(m.)</div><div>The cable tray layout drawing shall indicate cable routes in contractor scope of area. The contractor shall supply and install these cable routes for contractor's cable covered in Elecrical and C&I sections.</div></div> <div><div>(n.)</div><div>Complete cable erection includes supply and erection of all the accessories such as rigid/ flexible conduits, fittings, junction boxes, tying materials, cable tags, and markers, support structures, cable trays, cable termination, junction boxes etc. shall be under the scope of contractor.</div></div> <div><div>(o.)</div><div>Contractor shall provide Auto cad drawings, for all buildings under his scope along with equipment layout/sections. Architectural drawings shall also be provided.</div></div> <div><div>(p.)</div><div>The contractor shall furnish the complete and consolidated feeder list for DC system, LT system and HT system for all loads and drives under the scope of supply of</div></div>		
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	<p>contractor to Employer. Contractor shall indicate the location of his equipment in feeder load list in mutual agreed format.</p> <p>(q.) Contractor shall furnish the cable schedule as per mutually agreed format for all the cables under his scope of supply under Electrical and C&I section.</p>			
17.08.00	CABLES			
17.08.01	HT Power Cables			
	HT power cables as indicated in typical key single line diagrams for Aux Power Supply (Drg. No 6401-999-POE-J-001) along with necessary termination, lugs and glands as required for the complete plant.			
17.08.02	LT Power and Control Cables			
	LT Power and Control cables as required for the complete plant, building, equipment etc.			
17.08.03	EHV Power Cables			
	132kV cables along with necessary termination and accessories as indicated in typical key single line diagrams for Aux Power Supply (Drg. No 6401-999-POE-J-001)			
17.09.00	Earthing and Lightning Protection			
	Below ground and above ground earthing mat / Grounding and lightning protection for the complete plant is in the bidder's scope. All earthing pits shall be treated earth pits as per latest Indian Standard and IEEE guidelines.			
17.10.00	Station Lighting			
	<p>Bidder's scope includes the following:</p> <p>Design and Supply of Station lighting system for the plant, buildings and equipment under Bidder's area. All illuminations for power plant must be in conformity with international standards and sea turtle friendly. The type of illumination should be compliant to WII (Wildlife Institute of India)</p> <p>Lighting fixtures complete with lamps & accessories, LED lighting fixture complete with driver circuit & accessories, Lighting Panels, Receptacles, Switch boxes, Conduits. Lighting Wires, Ceiling fans or Wall mounted fans with regulators, lighting poles, Lighting masts, Earth wires and rods, Junction boxes, Battery operated automatic self-contained lighting fixture, Maintenance ladders as required.</p> <p>Scope shall also cover all interior and exterior lighting such as area lighting, aviation obstruction lighting, street lighting, security lighting etc.</p> <p>LED type lighting fixtures shall be provided for Lighting Mast.</p> <p>Contractor shall prepare complete lighting layout drawings of all the areas covered under this contract.</p>			
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17.11.00	<p>Mandatory spare parts and maintenance equipment as required.</p> <p>Out of the total requirement of lighting mast envisaged for station lighting, at least 6 Lighting Masts (30M height) shall be supplied, erected and commissioned at locations identified by Site Engineer prior to construction phase which shall cater to construction lighting and same shall later function as permanent lighting. Two number mobile lighting mast along with DG set shall also be provided.</p> <p>LED type lighting fixtures shall be provided for Lighting Mast.</p>			
	<p>DG SET</p> <p>6 no. DG sets with rating of 2MVA each shall be provided for meeting emergency requirement and safe shut down requirement of LNG power plant as well as emergency backup requirement of GNI island under Exigency/unavailability of LNG.</p> <p>Out of the above, Two DG sets shall be installed in LNG Power plant and the balance DG sets (4 nos.) shall be installed in transmission substation-2 (Gandhi Nagar) and substation-4 (Campbell bay).</p> <p>For LNG Power plant, DG set may use the existing LT Aux power transformers for stepping up DG voltage to 33kV level.</p> <p>For SS-2 and SS-4, Necessary transformers for stepping up DG output voltage to 33kV and interconnection to 33kV GIS switchgear through Cables shall also be in bidder's scope.</p>			
	<p>Control Philosophy for plant Electrical System</p> <p>Control of Electrical System shall be provided from plant DCS/SCADA with suitable ECD (Electrical Control Desk) and/or Soft HMI. The details of the same are specified in relevant sections of Control and Instrumentation.</p>			
	<p>Protection and Metering</p> <p>Necessary Protection and metering system as detailed in relevant portion of technical specification shall be provided.</p>			
	<p>CONSTRUCTION POWER</p> <p>To meet the construction power requirement of the project, DG sets shall be provided by the bidder. The Bidder shall extend supply from these DG sets to meet the construction power requirements at the various locations through LT distribution boards as per requirement. LT packaged substation along with isolation transformers may also be used for the purpose.</p> <p>Supply, erection, testing and commissioning of overhead lines ring mains, single pole /double pole/ four pole structures with switches, fuse, lightening arrestors, LT transformers, 415V switchboards, power and control cables, DC Systems etc. as required for meeting the construction power requirements, shall be in the bidder's scope. All necessary statutory requirements for charging bidder's construction power network shall be in the bidder's scope. The bidder shall also provide power for meeting the Employer's office/miscellaneous power requirements[100KVA]. Construction power supply network, within the plant, is a temporary arrangement which shall be used during the project construction phase. To meet this requirement, the equipment may be arranged by Bidder either by shifting their existing</p>			
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17.16.00	<p>equipment at other installation or by fresh procurement, which may be taken back after commissioning of the project.</p> <p>All temporary wiring must comply with Electricity rules, safety standards and other local regulations and will be subject to Employer's inspection and approval before</p>			
	<p>GAS INSULATED SWITCHGEAR</p> <p>The scope of work is for the Design, supply, erection, testing and commissioning of 132kV and 33 KV SF6 Gas Insulated Switchgear (GIS) as shown in the Single line diagram along with GIS building. The 132 KV switchgear shall employ Double Busbar scheme and 33kV switchgear shall employ single busbar scheme. The scope of work shall comprise, but not limited to the design, engineering, manufacture, testing and inspection at manufacturer's works, packing, supply, transportation, transit insurance, delivery to site, unloading, storage and equipment erection including associated structural works. Further the scope shall also include the cabling, lighting, lightning protection, earthing, air conditioning & ventilation, association of sub vendors in the erection, supervision, site testing, inspection and commissioning.</p> <p>The above scope of work shall also include overall project management, co-ordination, design, engineering, supply, erection, testing and commissioning including AIS portion in Switchyard and take off Gantry/AIS isolators at plant end and associated structural works in switchyard area.</p> <p>Execution of Civil works for switchyard along with AIS equipment and civil works for Tie transformers (50MVA) are in bidders scope.</p>			
	17.16.01	Feeder details: Bay details are as shown in the Single Line diagram Drg. No 6401-999-POE-J-001.		
17.16.02	Equipment and materials:			
	<p>I. 132kV and 33 KV Gas Insulated Switchgear Equipments</p> <ul style="list-style-type: none">- SF6 gas insulated metal enclosed bus bars, Circuit Breakers, Isolators, safety ground switches, High speed fault making ground switches, Current transformers, Surge arresters, GIS ducts, Local bay cabinets, SF6 gas monitoring equipments, Bus VTs, etc,- Complete earthing grid (inclusive of supply of 40 mm dia MS rod and GI flat) earthing of all GIS equipment.- Complete Direct Stroke Lightning Protection using Lightning Mast and/or shield wire and its connection to earth mat.- Supply and laying Armoured Power and control cables, Armoured FO Cables, screen cables, cabling (including inter and intra panel), cabling between Contractor supplied equipment and Owner supplied equipment required. Etc. and from present scope of panels to existing panels to complete the system is in the scope of Bidder. Cable trenches, cable support angles, cable trays and accessories as necessary for cable erection such as glands, lugs, clamps for cables, ferrules, cable ties, Hume pipe etc. cable route markers for buried cable trench are also included in the scope.- EOT Crane in GIS Building			
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	<div><div><div>- Lighting and Accessories</div><div>- AC/Ventilation for GIS building and control room buildings</div></div><div>II. 33 KV Outdoor AIS Isolators as shown in SLD.</div></div>		
17.16.03	<div>The equipment and materials to be supplied by the Contractor shall form a complete 132kV and 33 KV switchyard. The equipment and services as detailed in all sections of the bidding documents and as shown on the Single Line diagram shall be within the scope of supply of the Contractor. It is in the interest of the contractor to acquaint himself with the site conditions and scope before submission of offer.</div>		
17.16.04	<div>The list of items covered under the scope of supplies is as mentioned above. Any items though not specifically mentioned but which are required to make the switchyard complete in all respects for its safe, efficient, reliable and trouble free operation shall also be deemed to be included and the same shall be supplied and erected by the Contractor, unless they are specifically excluded in the text of exclusions given in relevant section.</div>		
17.16.05	<div>Following systems and components shall be provided for Control & Protection of 132kV and 33 KV system and Generator Relay Panels.</div> <div><div>a) Substation Automation System (SAS) shall be based on IEC 61850 protocol for control and protection of all 132kV and 33kV bays under the present scope, as per the Tender SAS Architecture Drawing.</div><div>b) SAS design, configuration, and testing shall comply with cybersecurity guidelines issued by CEA/GOI.</div><div>c) Numerical Protection System (Numerical relays) shall be provided in accordance with relevant Tender Single Line Diagrams (SLDs).</div><div>d) A fully equipped switchyard control room shall be provided, including all necessary auxiliary systems.</div><div>e) Panel-mounted Bay Protection Units (BPUs) and Bay Control Units (BCUs) shall be installed for all 132kV bays.</div><div>f) Complete busbar protection for all 132kV bays shall be within the bidder's scope.</div><div>g) Protection panels for Generator (Gen) and Generator Transformer (GT) shall be provided along with</div><div>h) One Operator Workstations (OWS) and one Engineering Workstations (EWS) to be provided in each Control Equipment Room (CER) of generators.</div><div>i) Power Supply System AC and DC power supply systems shall be provided for all EHV bay equipment.</div><div>j) As per protection SLDs and metering architecture, ABT-based energy metering shall be implemented. Dummy panels shall be provided for owner-supplied meters.</div><div>k) The metering network shall be independent of the SAS network but shall offer features equivalent to SAS.</div><div>l) Time Synchronization Equipment (TSE) shall be provided for both the switchyard and GRP.</div><div>m) Fiber Optic Transmission Equipment (FOTE) shall be provided with all necessary accessories for communication on each 132KV lines and one SLDC with redundant connectivity to each location.</div></div>		
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			Resistant b) External surface of transformer and accessories- Chemical resistant epoxy zinc phosphate primer, MIO (Micaceous iron oxide) as intermediate paint followed by polyurethane finish paint.	RAL 5012
	4.	Transformers- Cooler & Radiators	a) External surface- ISO 12944-5:2018, Table D.1, System no. G5.05 b) Internal surface- Hot oil proof, low viscosity varnish and subsequent flushing with transformer oil	RAL 5012 NA
	5.	Transformer marshalling Box	-	SS No painting
	6.	Dry Type Transformers	a) External Surface of Enclosure b) Internal Surface of Enclosure	RAL 5012 Full Glossy White
	7.	MV and LT Switchgear,	a) Front and Rear b) Extreme ends c) AC and DC MCCB Box d) Local Push Button Stations e) Lighting and Welding trf	RAL 9002 RAL 5012 RAL 9002 RAL 9002 RAL 9002
	8.	MV Bus Ducts/LT Bus Ducts	a) Exterior b) Interior c) Conductor surface	RAL 5012 Matt Mat Black/Manufacturers standard/Painted Aluminum alloy
	9.	NGR Cubicle	a) Heat Resistant Paint system b) Interior	RAL 5012 Glossy White
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	10.	PT-VT Cubicle	a) High quality Primer and Two coats of Synthetic enamel paint b) Interior	RAL 5012 Glossy White
	11.	DG SET	a) Enclosure b) DG Exterior c) Control Panel d) Day Oil Tank – Oil Resistant Paint	RAL 9002 RAL 9002 RAL 7032/9002 RAL 5012
	12.	Battery Charger	a) Front and rear- Two coats of lead oxide primer followed by powder painting. b) end cover- Two coats of lead oxide primer followed by powder painting.	RAL 9002 RAL 5012
	13.	Battery racks and associated cable supports	a) Three (3) coats of anti-alkali paint or b) Three (3) coats of anti-acid paint	-
	<p>Since the plant is located in vicinity to sea, painting system suitable for corrosion category C5 to be considered for all equipment. Bidders shall put up a detailed painting procedure for all equipment for employers' approval during detailed engineering stage covering necessary details and painting system / procedures which shall be applicable considering tropical and saline atmosphere applicable for this location.</p>			
17.18.00	<p>TYPE TEST</p> <p>Contractor shall meet the requirements of type tests on electrical equipment's as stipulated in relevant chapters of technical specifications.</p> <p>The Contactor shall submit the reports of the type tests as listed in "LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED" which are carried out within period from the date of bid opening as indicated in as per "CEA guidelines on validity of Type Test Reports". These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.</p>			
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	<p>However if the Contactor is not able to submit report of the type test(s) conducted within period from the date of bid opening as indicated in as per “CEA guidelines on validity of Type Test Reports”, or in the case of type test report(s) are not found to be meeting the specification requirements, the Contactor shall conduct all such tests under this contract at no additional cost to the Employer either at third party lab or in presence of client/Employers representative and submit the reports for approval.</p>	
17.19.00	MANDATORY SPARES	
	<p>Contractors scope shall include Mandatory Spares of all equipments as mentioned in the relevant portion of Technical Specification.</p>	
17.20.00	ELECTRICAL LAB AND ELECTRICAL WORKSHOP	
	<p>Electrical Testing Lab, with an air conditioned space of approx. 200 sq.m, shall be provided. in the Switchyard Control Room/ Auxiliary Building.</p> <p>The mandatory spare equipment's meant for outdoor storage shall be suitably stored in their desired position duly mounted on suitable pedestal on a concrete surface adjacent to lab/suitable location in the switchyard.</p>	
17.21.00		
	<p>a) Contractor shall submit soft copy of approved CAT-1 & final “AS BUILT” single line diagrams in AutoCAD format for record of the employer.</p> <p>b) Electrical simulation studies preferably in ETAP have to be carried out by contractor on plant auxiliary power supply network. This shall include but not limited to 33kv & 0.415KV SWGR system study power flow studies, Tap optimization, short circuit studies and motor starting studies , rating, fault current and sizing of power transformers, auxiliary transformers etc. Contractor shall submit the soft copy of the Electrical simulation files along with all required background data files and libraries for review and record of the employer.</p>	
17.22.00	<p>All electrical equipment shall be engineered, manufactured, and tested in strict compliance with the prevailing site-specific conditions, including but not limited to saline or corrosive atmospheres, seismic activity in earthquake-prone zones, and other environmental or operational stresses. The bidder shall ensure that the proposed equipment is capable of maintaining its intended performance characteristics and functional reliability throughout the specified design life, without degradation, deterioration or loss of efficiency under such conditions.</p>	
18.00.00	SUPPLIES FOR PLANT SERVICES	
18.01.00	<p>Bidder's Scope of Supply includes Supply of necessary material for the Plant services and Accessories of various equipment and systems as follows.</p>	
18.02.00	<p>Complete plant drain system together with all necessary piping, valves, fittings, supports, pumps and drives etc., so as to render the system complete.</p>	
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18.03.00	All the first fills of consumables such as greases, oil, lubricants, servo fluids / control fluids, chemicals etc. which will be required to put the equipment covered under the scope of specifications, into successful commissioning / initial operation and to establish completion of facilities shall be supplied by the Contractor. Suitable standard lubricants as available in India are desired. Efforts should be made to limit the variety of lubricants to minimum.	
19.00.00	ROOFTOP SOLAR	
19.01.00	<p>The Solar Photo Voltaic (PV) installation on Rooftop of various available buildings of the Power Plant shall be carried out preferably on shadow free area in such a way that the generation is maximized on each building suitable for installation of Solar PV power plants.</p> <p>The bidder has to install the solar PV rooftop system on the available buildings identified in this package on the basis of 15 square metre area(shadow free) per kwp and the bidder shall also consider utilizing all the available rooftops(Buildings) for installing solar PV project.</p>	
19.02.00	Determination of optimal grid connected roof-top Solar PV power plants capacity on the buildings of the power plant depending on available shadow free area.	
19.03.00	Complete design, engineering, manufacture, inspection, supply, transportation, storage, insurance, erection, testing, and commissioning of the grid connected rooftop Solar PV plants including all auxiliaries.	
20.00.00	SCOPE OF SERVICES	
20.01.00	Bidder's Scope of Services in respect of the equipment/ systems specified shall include all services required for Planning, Design, Engineering, Manufacture / Fabrication, Assembly, Pre-shipment Testing at manufacturer's works, Packing for Transportation, Transportation, Handling, Delivery at Plant Site, Storage, Installation, Interconnection with related plant and equipment, Commissioning, Initial Operation, and Conductance of Acceptance Tests.	
20.02.00	In addition to above, the Scope includes all other services necessary for meeting the intent and requirements of the specification within his quoted price. These shall include but shall not be limited to the following services for all equipment / systems as per the specification.	
20.03.00	Engineering Services and Engineering Documentation	
20.03.01	Scope includes System Design/ Engineering for all equipment and systems to ensure that the intent and requirements of the specification are fully met. The plant shall be engineered and designed strictly in accordance with the specification requirement.	
20.03.02	Scope includes preparation, submission and obtaining Employer's approval for all Engineering Drawings/ Documents as detailed in 'General Technical Requirements' (Volume VI, Part A) and tentative Master List of drawings, other sections/ subsections of Part B of Technical Specification. Drawings / documents mentioned above shall be prepared by the Contractor and submitted to the Employer as per schedule to be finalized before the award of this contract. Further, all drawings and documents pertaining to Gas engines and their associated auxiliaries shall be vetted by the qualified Gas engine manufacturer for this project before submitting to the Employer for review and approval.	
20.03.03	Engineering work shall be performed based on modern and proven concepts and internationally accepted good engineering practices but fully compatible with the Indian	
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	environment. Employer shall have the right to review and approve the engineering work by himself or herself and/ or through consultant and ask for any clarifications and changes/ modifications to the work performed by the Contractor.			
20.03.04	In course of review of Design Memorandums and Detailed Engineering, it may be essential in the opinion of Employer to obtain certain classified data for review purposes only. The Contractor shall furnish such data to Employer, if required.			
20.03.05	Technical Co-Ordination Meetings Scope includes Participation of Contractor's senior personnel and experts as well as major sub-vendors for this package in Technical Coordination Meetings (to be held at EOC Hyderabad, Vendor works, Plant site or mutually agreed venue) and other Meetings for discussions on technical issues as required by the Employer.			
20.04.00	Type Test Requirements Bidder's Scope includes conductance of Type Tests for Mechanical, Electrical and C&I Equipment as detailed in respective Volumes of Part B, Section VI.			
20.05.00	Packaging, Transportation and Insurance (Ocean & Inland), Dock Clearance Scope includes receiving of material/ equipment at site, unloading and proper storage. Proper storage of all mandatory spares and other equipment till handing over to the Employer shall also be under the scope of the Bidder.			
20.06.00	Training of Employer's Personnel Scope of training shall include training of Employer's personnel covering entire scope for the package. This shall cover all disciplines viz. Mechanical, Electrical, C&I, QA etc. Training shall include all the areas related to plant like Design familiarization and training on product design features of major equipment and systems, engineering, manufacturing, erection, commissioning, training on operating features of equipment, equipment maintenance, quality assurance and testing, plant visits and visits to manufacturer's works, exposure to various kinds of problems which may be encountered in fabrication, manufacturing erection, welding etc. Total duration of the training shall be of 5 (five) man months. The break-up of the training period shall be as following- i. 1 (One) Man month – At Engine manufacturers works/factory ii. 4 (four) Man months - Comprehensive training program consisting of classroom and plant visit of similar running plant for Employer's personnel for safe and efficient operation of the plant addressing the erection, commissioning, operation and maintenance aspects of the plant. Accommodation with lodging and boarding and local conveyance at the place of training shall be provided to the Employer's personnel free of cost. Cost of journey to and from the place of training shall be borne by the Employer.			
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	Details of the training shall be finalized during detail engineering of the project. Note: For training purposes, one (1) man month implies 30 working days (excluding all intervening holidays) per person		
20.07.00	Erection, Pre-commissioning, Commissioning, and Initial Operation		
20.07.01	Scope includes complete services for construction, erection, pre-commissioning and commissioning for all specified equipment/ systems. Manpower, equipment, material, consumables, chemicals, instruments and information for above shall be provided by the Contractor.		
20.07.02	Pre-commissioning, Commissioning, and Initial Operation shall be in accordance with the specification requirements indicated in 'General Technical Requirements' (Volume – VI of Part A) and Part B of Technical Specifications. Materials and services required for Pre-commissioning, Commissioning, and Initial Operation shall be in the Contractor's Scope.		
20.08.00	Start-up of Power Plant (i) Bidder's scope in respect of each Genset Module includes startup following completion of pre-commissioning and commissioning activities. The start-up shall include synchronization and up to base load operation of Genset units. Start-up activity shall also include proving/ establishing all the systems/ automatic controls and protections of the complete Genset modules and associated support systems. (ii) Separate start-up reports for all equipment shall be completed before the start of the respective "Initial Operation" of the Genset modules. (iii) The time between first start-up and start of 'Initial Operation' shall be considered as a part of the erection and installation period. Bidder's scope includes all commissioning/ operation manpower requirement during the intervening period of Start-up and Initial Operation.		
20.09.00	Acceptance Tests		
20.09.01	The Scope includes carrying out Acceptance Tests at Site for establishing the specified Performance and Functional Guarantees for acceptance by the Employer. Acceptance tests shall be carried out in accordance with the specification provisions of 'Guarantees and Performance Testing' (Volume V, Part A), 'General Technical Requirements' (Volume – VI of Part A) and requirements specified in Part B.		
20.09.02	The Contractor shall be responsible for making all necessary arrangements required for conductance of specified tests and accordingly the cost associated with the specified tests shall be included in the bid price. Contractor shall provide permanent arrangements in various equipment/systems for conductance of Performance and Guarantee tests by the Owner periodically. Employer's/Client's responsibility shall be limited to ensure power evacuation and arranging fuel.		
21.00.00	CONSTRUCTION FACILITIES		
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21.01.00	<p>Bidder's Scope of Work of for the construction facilities of the project is as follows:</p> <p>(i) Drinking Water -. Bidder shall arrange and make own arrangements for drinking water.</p> <p>(ii) Construction water - Water for construction purposes shall be arranged by the bidder. He shall make his own arrangement for drawl, pumping, storage and distribution etc. The drawal scheme, arrangement shall be subject to approval of NTPC. Bidder may discuss his drawl scheme / arrangement during his site visit before submitting his bid. Bidder shall exercise full restraint that the water drawn is minimum and not wasted. Quality of construction water should be such that it shall meet the requirement for construction purposes.</p> <p>No water shall be made available by NTPC for water supply to bidder's staff colony / labour camps. Bidder/Contactor shall arrange necessary accommodation bidder's staff & labour.</p> <p>(iii) Construction office and other facilities – The Contractor shall make his own construction office, construction store (open/ covered), fencing and construction workshop and material/ field testing laboratory etc. as required.</p> <p>(iv) All necessary fire fighting devices, equipment, fire tenders and extinguishers etc. required during the project execution stage shall be arranged by the Bidder.</p>			
20.02.00	Bidder's Scope includes lifting devices for handling, erection and maintenance of all the equipment and systems during construction stage.			
21.03.00	All equipment foundation loading data, all facilities layout and any other additional input as required during construction phase has to be supplied by Bidder.			
22.00.00	<p>SCOPE OF CIVIL, STRUCTURAL & ARCHITECTURAL WORKS</p> <p>The scope of civil, structural and architectural works shall include topographical survey, geotechnical investigation if required, site clearance, site grading, preparation of design documents and drawings and getting approval of the same from the Employer and construction of all civil, structural and architectural works including supply of all construction materials for all buildings, equipment and facilities for the project. The nature of work generally involves geotechnical investigation if required, earthwork in excavation in all types of soil and rock including controlled blasting (if required) / mechanical means, de-watering, backfilling around completed structures, plinth filling, disposal of surplus earth/rock/excavated material/dismantled material, concreting including reinforcement and form work, plastering, corrosion protection measures including painting, wall cladding, roofing and flooring including permanent steel decking, false ceiling, fabrication of structures, pre assembly of fabricated structures, transportation of pre-fabricated structures and erection of steel structures and miscellaneous steel works (i.e., steel staircase, cable supports, pipe supports, ladders, walkways, railing, chequered plate/grating floors, inserts etc.), painting of structures, paving, gravel filling, providing pre-cast covers, damp proofing, roof water proofing, roads, drainage, sewerage, rain water harvesting, final grading and site clearance before handing over and any other item of work required for completion of all systems under the scope of work complete.</p> <p>The scope of Bidder for civil, structural and architectural works as defined above shall include but not be limited to the following buildings/ areas/ systems along with their foundations, super structures and finishes complete.</p> <p>1. Site clearance including cutting of trees of girth less than 30 centimeters.</p>			
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	<div><div><div>एनटीपीसी NTPC</div></div></div> <p>supply & sewage system for switchyard buildings etc. and all other related works complete as per system requirement.</p> <p>11. Civil works associated with air conditioning & ventilation systems.</p> <p>12. Civil, Structural works for pipe /cable /duct supporting structures, trestles and foundations, trenches, culverts, duct banks, pedestals, hume pipe & culverts, buried pipes, racks, culverts across road for pipes/ drains/ cables and any other facility and thrust blocks etc.</p> <p>13. Civil, Structural works for Pipe/Cable supports/trestle in Plant areas.</p> <p>14. Outdoor transformer foundations.</p> <p>15. Earth mats and risers for Plant area.</p> <p>16. LT Switchgear building.</p> <p>17. Fire Station Building including offices, toilet, pantry</p> <p>18. O&M Stores</p> <p>19. Gate Complex with Time office.</p> <p>20. Watch Towers</p> <p>21. Rain water harvesting pit</p> <p>22. Facilities for Rain water harvesting in all buildings in the bidder's scope.</p> <p>23. Safety centre</p> <p>24. Safety Park</p> <p>25. Car parking</p> <p>26. All Civil, Structural, Architectural works including underground facilities like drainage, sewerage & electrical works for enabling township (prefabricated bachelor accommodation and Guest House)</p> <p>27. Any other miscellaneous building or facility.</p>		
22.01.00	<p>All steel structures can be site fabricated and erected at site or fabricated in factory, transported and erected at site. All factory-fabricated structures can have bolted or welded field connections.</p> <p>Note: Steel structures shall mean plant and non-plant building structures, support structures, pipe and cable support structures. Civil, structural and architectural works though not explicitly mentioned in the above list but required for the completion of the various systems of the package shall also be in the scope of the bidder.</p>		
22.02.00	<p>Corrosion Protection</p> <p>The plant lies in the corrosive category CX as per ISO 12944-2. Protection measures shall be provided for the mentioned corrosivity category with very high durability as specified in Part-B of Technical Specifications.</p>		
22.03.00	<p>Supply of earth for filling & disposal of surplus earth/ debris including arranging the borrow pit/ disposal site and making payment of Seigniorage, royalty, levies, taxes and any other applicable charges etc. shall be in bidder's scope.</p>		
22.04.00	<p>PROOF CHECKING</p> <p>The scope of work of the successful bidder includes: -</p> <div><div>a)</div><div>To interact, discuss with Owner / Proof Checking (PC) agency for the modalities, schedule, and design parameters, loading to be considered in line with the Owner's specifications.</div></div> <div><div>b)</div><div>To submit the drawings and design calculations as per the project schedule sequentially as per the sequence below.</div></div> <div><div>c)</div><div>Incorporate all the comments/observations/suggestions furnished by the PC on the drawings and design documents.</div></div> <div><div>d)</div><div>After reviewing the drawings and design documents by PC the same shall be submitted to the Owner for consent. In case of further observation by Owner the same is also to be incorporated.</div></div>		
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	<p>Sequence of submission of documents: -</p> <ul style="list-style-type: none">1) Design basis which will include all design philosophy, seismic and wind criteria as per specification, foundation type along with bearing capacity as per Geotechnical Report, materials of construction, loading details, finishing schedule etc.2) Architectural details/General Arrangement drawings for buildings, facilities, equipment including the elevations and cross sections.3) Design calculation along with the STAAD/ANSYS/SAP 2000 models and/or computer work sheets or any other software model as mutually agreed with Owner.4) Foundation drawings.5) Superstructure drawings sequentially as per construction sequence or material projection, as applicable.			
22.05.00	<p>WORKER & STAFF COLONY AND CONSTRUCTION FACILITIES</p>			
22.05.01	<p>WORKER & STAFF COLONY</p> <p>The following are in the Bidder's scope of work for Worker & staff colony: -</p> <ul style="list-style-type: none">a) Development of Bidders temporary staff colony and worker colony along with toilets & fencing etc. For safety of Worker, bidder to provide separate approach road for their movement, as per site conditions, which shall be completely isolated from material movement road/path. No material movement shall be allowed on approach road meant for worker colony.b) Adequate no. of Rest rooms with toilet for bidder's worker & staff.c) All Civil and Structural work associated with drinking and service water for Bidder's worker and other personnel at the work site/colony/offices including pump houses, pipes, overhead tank, tube wells etc.d) The EPC Contractor shall have total responsibility for providing and maintaining facilities for safety, welfare, drinking water and sanitation, hygiene, biennial health checkup etc. for construction workers at their workplaces as well as at worker & staff colonies. The facilities for occupational safety, healthy environment, first aid, drinking water, resting place & toilets, canteen, crèche, etc. shall be provided at the workplace for construction workers by the contractor.e) Accommodation for Workers & staff colony in adequate numbers as required for the project peak demand shall be made in the form of temporary structures which shall be removed after completion of the project. It shall have facilities for drinking water & sanitation, approach road, dust suppression, drainage, sewage treatment plant, solid waste collection & disposal, fuel for cooking, medical healthcare, creches, etc.f) Responsibility of development and maintenance of above facilities for construction workers hired by the Contractor or his sub-contractors shall rest solely with the Contractor. Land, water, electricity for the worker & staff colony shall be arranged by the Contractor as stipulated elsewhere in Technical Specification.			
22.05.02	<p>CONSTRUCTION FACILITIES</p> <p>The following are in the Bidder's scope of work pertaining to construction facilities in this package:</p> <ul style="list-style-type: none">1. Construction Water Construction water shall be the responsibility of Bidder during all stages of construction.2. Construction Power Construction Power shall be the responsibility of Bidder during all stages of construction.3. Construction of following temporary facilities of bidder<ul style="list-style-type: none">a. Construction office,b. Construction stores (covered) & open stores as per his requirement.c. Workshops for maintenance of construction plant and equipment.			
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	<div>e) Levelling, compaction backfilling, for purpose of laydown area surface preparation</div> <div>f) Hard crusting of Laydown area, fabrication, and pre-assembly yard area has to be carried out as per specifications mentioned elsewhere. The extent of hard crusting shall be decided by the contractor based on their requirement. Material and equipment storage shall be as per guidelines covered elsewhere.</div>			
23.00.00	SPARES			
23.01.00	Following Spares are included in the scope of supply as per the applicable provisions: <div>(i) Mandatory Spares</div> <div>(ii) Recommended Spares</div> <div>(iii) Start-up Spares / Commissioning Spares</div>			
23.02.00	<div>Mandatory Spares</div> <div>a) The list of mandatory spares considered essential by the Employer is indicated in this chapter/volume at Annexures – IA, IB, IC & ID. The bidder shall indicate the prices for each and every item (except for items not applicable to the bidders design) in the 'Schedule of mandatory Spares whether or not he considers it necessary for the Employer to have such spares. If the bidder fails to comply with the above or fails to quote the price of any spare item, the cost of such spares shall be deemed to be included in the contract price. The bidder shall furnish the population per unit of each item in the Bid Forms and Price Schedules. Whenever the quantity is mentioned in "sets" it pertains to the requirement for one no. of Engine/Equipment wherever the same has not been detailed in the specification. The bidder has to give the item details and prices of each item.</div> <div>b) The Employer reserves the right to buy any or all the mandatory spares parts.</div> <div>c) The prices of mandatory spares indicated by the Bidder in the Bid Proposal sheets shall be used for bid evaluation purposes.</div> <div>d) All mandatory spares shall be delivered at site at least two months before scheduled date of initial operation of the first unit. However, spares shall not be dispatched before dispatch of corresponding main equipment.</div> <div>e) Wherever quantity is specified both as a percentage and a value, the Bidder has to supply the higher quantity until and unless specified otherwise.</div> <div>f) Wherever quantity has been specified as percentage (%), the quantity of mandatory spares to be provided by contractor shall be the specified percentage (%) of the total population of the plant. In case the quantity so calculated happens to be fraction, the same shall be rounded off to next higher whole number.</div> <div>g) Unless stated otherwise a 'set' means items or subitems required for each type/size range of the assembly/ sub-assembly, required for replacement in one main</div>			
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	necessary.			
23.06.00	All spares supplied under this contract shall be strictly inter changeable with the parts for which they are intended for replacements. The spares shall be treated and packed for long storage under the climatic conditions prevailing at the site e.g. small items shall be packed in sealed transparent plastic with desecrator packs as necessary.			
23.07.00	All the spares (both recommended and mandatory) shall be manufactured along with the main equipment components as a continuous operation as per same specification and quality plan.			
23.08.00	The contractor will provide Employer with cross-sectional drawings, catalogues, assembly drawings and other relevant documents so as to enable the Employer to identify and finalise order for recommended spares.			
23.09.00	Each spares part shall be clearly marked or labelled on the outside of the packing with its description. When more than one spares part is packed in a single case, a general description of the content shall be shown on the outside of such case and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purposes of identification.			
23.10.00	All cases, containers or other packages are to be opened for such examination as may be considered necessary by the Employer.			
23.11.00	The contractor will provide the Employer with all the addresses and particulars of his sub suppliers while placing the order on vendors for items/components/equipment covered under the contract and will further ensure with his vendors that the Employer, if so desires, will have the right to place order for spares directly on them on mutually agreed terms based on offers of such vendors.			
23.12.00	The Contractor shall warrant that all spares supplied will be new and in accordance with the contract Documents and will be free from defects in design, material and workmanship.			
23.13.00	In addition to the recommended spares listed by the contractor, if the employer further identifies certain particular items of spares, the contractor shall submit the prices and delivery quotation for such spares within 30 days of receipt of such request with a validity period of 6 months for consideration by the Employer and placement of order for additional spares if the Employer so desires.			
23.14.00	The Contractor shall guarantee the long term availability of spares to the Employer for the full life of the equipment covered under the contract. The Contractor shall guarantee that before going out of production of spares parts of the equipment covered under the Contract, he shall give the Employer atleast 2 years advance notice so that the latter may order his bulk requirement of spares, if he so desires. The same provision will also be applicable to sub-contractors. Further, in case of discontinuance of manufacture of any spares by the Contractor and/or his sub contractors, Contractor will provide the Employers, two years in advance, with full manufacturing drawings, material specifications and technical information including information on alternative equivalent makes required by the Employer for the purpose of			
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	manufacture/procurement of such items.	
23.15.00	<p>Material Codification</p> <p>The bidder to provide datasheets/ assembly drawings of the manufacturer/ any other relevant document showing Bill of Material(s), Make, Model Number, Part Number etc. through which mandatory spares to be supplied can be uniquely identified. This would facilitate the Employer to assign a unique code to each of the mandatory spare as brought out in GCC. The bidder shall extend all necessary assistance in this regard.</p>	
23.16.00	<p>In case spares indicated in the list are not applicable to the particular design offered by the bidder, the bidder should offer spares applicable to offered design with quantities generally in line with the approach followed in the lists of mandatory spares.</p>	
23.17.00	<p>Interchangeability and Packings:</p> <p>All spares supplied under this contract shall be strictly interchangeable with parts for which they are intended for replacements. These spares should include all mounted accessories like components, boards, add or items, fitting, connectors etc. and be complete in all respects so that the replacement of the main items by these spares does not require any additional item. The vendors must conform the pair to pair compatibility of each electrical spares modules with the modules should be supplied in the original package. All electronic modules should be preset and/or preprogrammed for ready use at site. Alternatively, suitable instruction sheet indicating the details of required PCB jumper position, BCD which is setting, EPROM/PROM listing etc should be packed along with each module. Also a caution mark sign should be put on all such module which needs presetting/pre-programming before putting them in to service. The spare shall be treated and properly packed for long term storage.</p>	
23.18.00	<p>Identification:</p> <p>Each spare shall be clearly marked and labeled on the outside of the packing with its description. When more than one spare part is packed in single case, a general description of the contents shall be shown on the outside of such case and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purpose of identification.</p>	
23.19.00	<p>Wherever the quantity is given only in percentage, the spare quantity shall be distributed into various ranges/size/rating/type (as the case may be) in the same proportion of the main population. The percentage shall be taken for the full population of the plant, unless otherwise mentioned. For the quantities coming less than 1, shall be treated as 1 only.</p>	
24.00.00	<p>TOOLS & TACKLES</p> <p>The Contractor shall supply within this Contract all necessary maintenance and inspection tools including special tools & tackles required for the disassembly, assembly, maintenance inclusive but not limited to, alignment tools for all rotating equipment, rotor removal equipment, torque wrenches capable of meeting all torque tightening requirements.</p> <p>Supply of all necessary tools, tackles, and commissioning spares, including all types of electronic modules, power supply units, consumables like printer paper, printer cartridge / toner, etc. required for commissioning, initial operation till the completion of facilities, test instruments and deputing of experienced personnel for completion of the above erection,</p>	
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	<p>testing and commissioning work. A comprehensive list of all such items envisaged shall be submitted for Employer's review prior to commencement of erection/commissioning activities.</p> <p>Tools shall be of a suitable brand, new and unused and shall be stored in the correct manner and at appropriate locations.</p> <p>All Precision and Special Tools shall be required to be accompanied with a Certified Calibration document for twelve months.</p> <p>A list of tools to be supplied has been included in Annexure-II of this volume. Further, the bidder shall furnish a list of tools & MC equipment with the Bid documents to the Employer, which shall be discussed and finalized during post bid discussions. All tools not listed in the inventory list and found to be necessary for maintenance of the works shall be deemed to be included in the Contract price.</p>													
25.00.00	SUPERVISION OF OPERATION & MAINTENANCE/INSPECTION OF PLANT													
	<p>Scope includes one year supervision during operation and maintenance with deputation of 1 operation and 1 maintenance expert post successful completion of initial/trial operations & Performance guarantee tests including Demonstration tests of initial 84MW (whichever occurs later).</p> <p>Operation & Maintenance upto start of supervision of O&M shall be in bidder scope.</p>													
26.00.00	TERMINAL POINTS													
	<table><tr><td>(i)</td><td>Fuel</td><td>:</td><td>Tap-off from gas supplier within plant premises. Exact location of tap-off point shall be informed during detailed Engineering. Bidder to connect gas supply line with incoming gas lines inside the plant boundary at terminal point of gas.</td></tr><tr><td>(ii)</td><td>Plant Effluent</td><td>:</td><td>To meet the ZLD criteria, Solar Pond has been envisaged for evaporation of RO reject as much as possible. Balance water shall be utilized in internal horticulture purpose. Surplus/Overflow water from Solar Pond (if any) shall be discharged into sea complying with all applicable norms.</td></tr><tr><td>(iii)</td><td>Electrical</td><td>:</td><td>132kV & 33kV line take off gantry(s) at generation switchyard as indicated in SLD Terminal Points for interconnection of emergency backup DG sets to be installed in transmission substation-2 (Gandhi Nagar) and substation-4 (Campbell bay) shall be owners 33kV Switchgear terminal. Bidder shall provide step-up transformer of suitable capacity for connection of DG to 33kV level.</td></tr></table>		(i)	Fuel	:	Tap-off from gas supplier within plant premises. Exact location of tap-off point shall be informed during detailed Engineering. Bidder to connect gas supply line with incoming gas lines inside the plant boundary at terminal point of gas.	(ii)	Plant Effluent	:	To meet the ZLD criteria, Solar Pond has been envisaged for evaporation of RO reject as much as possible. Balance water shall be utilized in internal horticulture purpose. Surplus/Overflow water from Solar Pond (if any) shall be discharged into sea complying with all applicable norms.	(iii)	Electrical	:	132kV & 33kV line take off gantry(s) at generation switchyard as indicated in SLD Terminal Points for interconnection of emergency backup DG sets to be installed in transmission substation-2 (Gandhi Nagar) and substation-4 (Campbell bay) shall be owners 33kV Switchgear terminal. Bidder shall provide step-up transformer of suitable capacity for connection of DG to 33kV level.
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27.00.00	EXCLUSIONS			
	(i)	Power Evacuation lines beyond terminal points as indicated in SLD		
	(ii)	PLCC/HF cables/ communication cable beyond FO terminal equipment		
	(iii)	RLNG Supply		

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	ANNEXURE-IA			
	LIST OF MANDATORY SPARES: MECHANICAL			
	Gas Engine and Auxiliaries:			
	Sl. No.	Item Description	Quantity	
	Engine Block, Bearings, Oil Sump & Covers			
	1.	Camshaft Bearing Bush	10% of total population of all engines.	
	2.	Cylinder head screw	5% of total population of all engines.	
	3.	Cylinder liner	10% of total population of all engines.	
	4.	Anti-polishing Ring	10% of total population of all engines.	
	5.	Sealing Set	10% of total population of all engines.	
	6.	Thrust Bearing Kit	20% of total population of all engines.	
	7.	Main Bearing Kit	20% of total population of all engines.	
	8.	Sealing kit for Covers & End Covers	10% of total population of all engines.	
	Connecting Rod & Piston			
	9.	Big End Bearing kit	10% of total population of all engines.	
	10.	Piston	1 nos. X number of engines offered.	
	11.	Piston Ring set	1 nos. X number of engines offered.	
	12.	Small End Bearings	10% of total population of all engines.	
	13.	Connecting Rod Screws	10% of total population of all engines.	
	14.	Shims	20% of total population of all engines.	
	15.	Connecting Rod	1 nos. X number of engines offered.	
	16.	Securing Ring	10% of total population of all engines.	
	17.	Gudgeon Pin	10% of total population of all engines.	
	Cylinder Head with Valves			
	18.	Cylinder Head	1 no. X number of engines offered.	
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	19.	Starting valve	1 no. X number of engines offered.
	20.	Inlet valve (complete)	1 no. X number of engines offered.
	21.	Sealing set for Cylinder head replacement	1 no. X number of engines offered.
	22.	Seat ring for inlet valve	1 no. X number of engines offered.
	23.	Seat ring for outlet valve	1 no. X number of engines offered.
	24.	Sealing set for cylinder head overhaul	1 no. X number of engines offered.
	25.	Exhaust Valve (complete)	1 no. X number of engines offered.
	Valve Mechanism & Camshaft		
	26.	Intermediate Gear	10% of total population of all engines.
	27.	Intermediate Gear Bearing	10% of total population of all engines.
	28.	Camshaft piece	1 no. X number of engines offered.
	29.	Push Rod	10% of total population of all engines.
	30.	Protecting pipes	10% of total population of all engines.
	31.	Valve tappet	10% of total population of all engines.
	32.	Gear	10% of total population of all engines.
	33.	Guide pin	10% of total population of all engines.
	34.	Screw	10% of total population of all engines.
	Turbocharger, charge Air Cooler & Waste Gates		
	35.	Charge Air Cooler	10% of total population of all engines.
	36.	Turbocharger Bearings	20% of total population of all engines.
	37.	Turbocharger Thrust collar	1 nos. X number of engines offered.
	38.	Turbine Inlet casings	1 no. X number of engines offered.
	39.	Turbocharger Nozzle Ring	1 no. X number of engines offered.
	40.	Turbocharger Shroud Ring	1 no. X number of engines offered.
	41.	Turbine outlet Casings	1 no. X number of engines offered.
	42.	Turbocharger Rotor & Rotating parts	1 no. X number of engines offered.
	Ignition Equipment & Gas Manifold		
	43.	spark plug	3 nos. X number of engines offered.
	44.	Pre combustion chamber valve	1 nos. X number of engines offered.
	45.	Ignition module	1 no. X number of engines offered.
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	46.	Connection piece/pipes (All types)	1 nos. each type X number of engines offered.
	47.	Ignition cable	1 nos. X number of engines offered.
	48.	Main Gas admission valves	1 nos. X number of engines offered.
	Lubricating oil system		
	49.	Pump Sealing Set	1 sets X number of engines offered.
	50.	Fuel Feed pipes	1 no X number of engines offered.
	51.	Lube oil pump Bearings	10% of total population of all engines.
	52.	Lube Oil service Kit	20% of total population of all engines.
	53.	Lube Oil Thermostat element	20% of total population of all engines.
	54.	Lube Oil Thermostatic element set	1 nos. X number of engines offered.
	55.	Lube Oil filter Candles	20% of total population of all engines.
	56.	Lube oil pump Driving Gear	1 no. X number of engines offered.
	57.	Pre-Lube Oil pump gear	1 nos. X number of engines offered.
	Governor		
	58.	Governor Drive Bearing	1 set X number of engines offered.
	Cooling water System		
	59.	LT water pump	1 no. X number of engines offered.
	60.	HT water pump	1 no. X number of engines offered.
	61.	Driving gear (All types)	10% of total population of all engines
	62.	NRV for cooling pumps	10% of total population of all engines
	Exhaust System		
	63.	Positioner	5% of total population of all engines.
	64.	Bellows (All types)	10% of total population of all engines (each type)
	65.	Multiduct service Kit	20% of total population of all engines
	Automation & Engine Control		
	66.	Knock Sensor	1 no. X number of engines offered.
	67.	Temperature Sensor (All types)	10% of total population of all engines (each type)
	68.	Control Unit CCM	1 no. X number of engines offered.
	69.	Electronic Unit IOM	1 nos. X number of engines
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		offered.	
70.	Control Unit	20% of total population of all engines	
71.	Engine Safety module	20% of total population of all engines	
72.	Pressure Transducer	10% of total population of all engines	
73.	Pressure Sensor (All types)	10% of total population of all engines (each type)	
74.	I/P Convertor	20% of total population of all engines	
75.	Speed Pick-Up (All types)	20% of total population of all engines (each type)	
76.	Speed sensor	20% of total population of all engines (each type)	
77.	Limit Switch (All types)	10% of total population of all engines (each type)	
Starting Air System			
78.	Starting Air Master Valves of each drive type	20% of total population of all engines (each type)	
79.	Start Blocking Valve	20% of total population of all engines	
80.	Flame Arrestor	20% of total population of all engines	
Other spares			
81.	O ring (All types)	10% of total population of all engines (each type)	
82.	Sealing sets (All other types not mentioned above)	20% of total population of all engines (each type)	
83.	Butterfly valves (All types)	20% of total population of all engines (each type)	
84.	Filter cartridge (All types other than Lube Oil filter)	10% of total population of all engines (each type)	
85.	Bellows (All types) other than exhaust system	20% of total population of all engines (each type)	
Note:			
<ul style="list-style-type: none">Wherever quantity has been specified as percentage (%), the quantity of mandatory spares to be provided by contractor shall be the specified percentage (%) of the total population of all engines. In case the quantity so calculated happens to be fraction, the same shall be rounded off to next higher whole number. For example: Number of engines offered for particular type of engine = 9 Number of camshafts bearing bush/ engine = 14 Number of camshaft bearing bush in specification = 20% of total population of all engines Number of camshaft bearing bush offered in mandatory spares = 14X9X0.2 = 25.2 ~ 26			
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	<ul style="list-style-type: none">Wherever the quantities have been indicated for each type, size, thickness, material, radius, range etc., these shall cover all the items supplied and installed and the breakup for these shall be furnished in the bidAll the mandatory spares of engines shall be supplied as per quantity mentioned in above table for each type of engine supplied in the package. For Example: Camshaft Bearing Bush - 20% of total population of all engines. Number of engines of type 1 = 2 Number of engines of type 2 = 9 Number of camshafts bearing bush/ engine type 1 = 10 Number of camshafts bearing bush/ engine type 2 = 14 Number of camshaft bearing bush offered in mandatory spares for Engine type 1 = 2 X 10 X 0.2 = 4 Number of camshaft bearing bush offered in mandatory spares for Engine type 2 = 9 X 14 X 0.2 = 25.2 ~ 26			
WATER SYSTEM:				
(A) PT & ETP Systems (As applicable)				
Sl. No	Name of Items	Unit	QTY	
1.	Pack of Lamella Clarifier	Set	1	
2.	Turbine drive shaft assembly	Set	1	
3.	Rake (Scraper) drive shaft assembly	Set	1	
4.	Rake (Scraper) drive	Set	1	
5.	All Bearings required for motors, Turbine drive, and Rack drive	Set	1	
6.	Oil Skimmer	Set	1	
Note: One set consists of quantity required for complete replacement of one clarifier/skimmer.				
(B) Dual Media (DMF) Filters				
Sl. No	Name of Items	Unit	QTY	
1.	Inlet Water Distributor Assembly	Set	1	
2.	Strainers / Nozzles of Under drain Collector OR Header Lateral Collector (whichever is applicable)	Set	1	
3.	Filter Media	LOT	One full charge for one filter + 10%	
Note: One set consists of quantity required for complete replacement for one filter				
(C) Filter Air Blowers				
Sl. No	Name of Items	Unit	QTY	
1.	Filter Air Blower	Set	1	
Note- 1 Set of each type/size/MOC for complete replacement for one assembly				
(D) Cartridge Filtration Units				
Sl. No	Name of Items	Unit	QTY	
1.	Cartridge Filters Element	Set	1	
One set consists of quantity required for complete replacement for one filter				
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(E) UF System

Sl. No.	Name of Items	Unit	QTY
1)	UF Membrane	Set	1

Note: One set consists of quantity required for complete replacement for one assembly

(F) RO System

Sl. No.	Name of Items	Unit	QTY
1.	RO Pressure tube complete with membrane assembly	set	1
2.	RO membranes	set	1

Note: One set consists of quantity required for complete replacement in one Pressure tube / RO membrane

(G) Energy Recovery (ERU) Units (if applicable)

Sl. No.	Name of Items	Unit	QTY
1.	ERU / PX Exchangers	Set	100 % of ERU / PX units installed for one RO train/stream

Note: One set consists of quantity required for complete replacement for one Turbo Charger / PX pump as the case may be

(H) Chemical Cleaning System (UF & RO Plant)

Sl. No.	Name of Items	Unit	QTY
1.	Mixer (Agitator) of Chemical Tanks	NO	1
2.	Chemical Cleaning Pump & Motor	NO	1
3.	Cartridge Filter Element	Set	1

Note: One set consists of quantity required for complete replacement for filter

(I) Flushing Cleaning System (UF & RO Plant)

Sl. No.	Name of Items	Unit	QTY
1.	Flushing Pump & motor	NO	1


(J) Pumps (1 number of each type/size/MOC for Raw water, Pre-treatment, UF, RO, Back wash, Post-treatment, Dosing, effluent system etc)

Sl. No.	Name of Items	Unit	QTY
1.	Horizontal Centrifugal Pumps	Set	1
2.	Vertical Pumps (If applicable)	Set	1

Note- One set consists of quantity required for complete replacement for one Pump


(K) Valves


Sl. No.	Name of Items	Unit	QTY
1.	Valves of all types	No	1 numbers of each type / size /material of construction

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	<u>PLANT UTILITIES:</u>		
	1.00.00	Compressed Air System:	
	1.01.00	Oil free Screw Air Compressor	
	1.01.01	Complete H.P Stage with HP element	1 No.
	1.01.02	Complete L.P Stage with LP element	1 No.
	1.01.03	Motor Bearings	2 Sets
	1.01.04	LP stage Pinion	1 No.
	1.01.05	HP stage Pinion	1 No.
	1.01.06	Air Oil Filter Kit	4 Nos.
	1.01.07	After cooler Safety Valve (if applicable)	1 No.
	1.01.08	Inter Cooler Safety Valve (if applicable)	1 No.
	1.01.09	Oil Pump kit	2 Nos.
	1.01.10	After cooler drain valve kit (if applicable)	1 No.
	1.01.11	Inter cooler drain valve kit (if applicable)	1 No.
	1.01.12	Air receiver drain/moisture trap	1 No.
	1.01.13	'O' Rings for oil cooler	8 Nos.
	1.01.14	Moisture separators for Aftercooler (if applicable)	2 Nos.
	1.01.15	Moisture separators for Intercooler (if applicable)	2 Nos.
	1.02.00	AIR DRYING PLANT (TWIN TOWER TYPE) FOR IA SYSTEM (AS APPLICABLE)	
	1.02.01	Pre filter element (Ceramic candle or as applicable)	2 sets
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	1.02.02	After filter element (Ceramic candle or as applicable)	2 sets
	1.02.03	Valves & Valve Actuators (pneumatic/hydraulic)	2 sets
	1.02.06	Heater coil for temperature stabilization (for HOC type) (as applicable)	2 sets
	1.02.07	Desiccant for Air Dryer	One complete fill for both towers of one Dryer
	1.03.00	MEASURING INSTRUMENTS	
		1 Electronic Transmitters	
		(i) Transmitters of all types, ranges and model no. (for the measurement of Pressure, differential pressure flow, level, etc.)	2 Nos. of each type and model
		2 Temperature elements	
		(i) RTD's* of each type and length	2 Nos. of each type and length
		ii) Thermocouples of each type like K-type, R-type, metal etc. and length *	2 Nos. of each type and length
		(iii) Thermowell	2 Nos. of each type and length
		(iv) Temperature transmitters (if applicable)	2 Nos. of each type
		3 Process Actuated Switch Devices Includes all types of Pressure, differential pressure, flow, temperature, differential temperature, level switch Devices	2 Nos. of each type and model
		4 Dew Point meters with sensor	1 No.
		6 Solenoids	2 Nos. of each type
		7 Actuators (if applicable)	1 No.
	1.03.00	MICROPROCESSOR BASED/PLC BASED CONTROL/ELECTRONIC BASED CONTRAL PANEL (IF APPLICABLE)	
	1	Fully programmed controller of electronic modules of each type (as applicable)	1 No.
	2	Power supply module (if applicable)	1 No.
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3.00.00	1.04.00	Rotary drum type Air drying plant for Instrument Air system (As applicable)		
	1.	Drive assembly consisting of motor, gear boxes, drive shaft & coupling	1 set	
	2.	Desiccant for Air Dryer	one complete fill of one dryer	
	1.05.00	Air compressor motor	1 no.	
	Notes:			
	1. Wherever set is mentioned, one set of the spares of that item shall be for complete replacement of that particular item for one equipment.			
	2. Any fraction of a item shall mean the next higher integer.			
	3. Wherever quantity has been specified as percentage (%), the quantity of mandatory spares to be provided by contractor shall be the specified percentage (%) of the total population of the plant. In case the quantity so calculated happens to be fraction, the same shall be rounded off to next higher whole number.			
	4. Unless stated otherwise a 'set' means items or sub-items required for each type/size range of the assembly/sub-assembly, required for complete replacement in one unit. It is further, intended that the assembly/sub-assembly which have different orientation (like left hand or right hand, top or bottom), different direction of rotation or mirror image positioning or any other reasons which result in maintaining two different sets of the spares to be used for the subject assembly/sub-assembly, these			
	5. shall be considered as different types of assembly/sub-assembly.			
	FIRE DETECTION AND PROTECTION SYSTEM			
		ITEM DESCRIPTION	QUANTITY	
	1.0	PUMPS	Main Pump	Jockey Pump
	1.1	Impeller	1 Set	1 Set
1.2	Pump bearing (Incl. thrust brg, journal brg., line shaft brg.)	1 Set	1 Set	
1.3	Pump shaft	1 Set	1 Set	
1.4	Wearing rings	2 Sets	2 Sets	
1.5	Shaft Sleeve	1 Set	1 Set	
1.6	Bushings	2 Sets	2 Sets	
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		ITEM DESCRIPTION	QUANTITY	
	1.7	Bearing housing (if provided)	1 Set	1 Set
	1.8	Coupling bolts & nuts(with bushes)	1 Set	1 Set
		Note: Above quantity/items are required for each type and rating of pumps being supplied under the contract.		
	2.0	DIESEL ENGINE (1 set means item required for 1 diesel engine)		
		ITEM DESCRIPTION	QUANTITY	
	2.1	Sprayers/Injector	1 set	
	2.2	Piston rings & sealing rings	2 Sets	
	2.3	Exhaust valve assembly	1 Set	
	2.4	Springs	1 Set	
	2.5	Packings and gaskets	1 Set	
	2.6	Fuel oil filter elements with seals	2 Sets	
	2.7	Fuel oil filter assembly	1 Set	
	2.8	Lub. oil filter elements with seals	2 Sets	
	2.9	Scraper rings (if applicable)	1 Set	
	2.10	Solenoid coil for fuel valve	1 No.	
	2.11	Corrosion inhibitor (if provided)	1 Set	
	2.12	Big end & small end bearing of connecting rod	1 Set	
	2.13	Speedometer (if applicable)	1 No.	
	2.14	Speedometer wire (if applicable)	1 No.	
	2.15	Rubber hoses of water line with mounting clamps	1 Set	
	2.16	Cranking starter assembly complete	1 Set	
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		ITEM DESCRIPTION	QUANTITY
	2.17	Lub. oil and fuel oil hoses with end connectors	1 Set
	2.18	Water pump belts (if applicable)	2 Sets
		Above quantity/items are required for each type and rating of diesel engine being supplied under the contract	
	3.0	FIRE HOSES WITH COUPLINGS	
	3.1	7.5m long fire hoses (internal) with end connectors	10% of population
	3.2	15m long fire hoses (internal) with end connectors	10% of population
	3.3	15m long fire hoses (external) with end connectors	10% of population
	4.0	BRANCH PIPES WITH NOZZLES	
	4.1	Nozzles with branch pipes & quick coupling ends (internal)	10% of population
	4.2	Nozzles with branch pipes & quick coupling ends (external)	10% of population
	5.0	DELUGE VALVE ASSEMBLIES	
	5.1	Complete deluge valve assembly along with internals and accessories	10% of population or minimum 1 Set for each size/type/model
	5.2	Clapper assembly complete (consisting of clapper seat rubber, screws, etc.)	10% of population or minimum 1 Set for each size/type/model
	5.3	Solenoid coils	10% of population or minimum 1 Set for each size/type/model
	6.0	VALVES (GATE/GLOBE/BUTTERFLY/NRV) (AS APPLICABLE)	
	6.1	Complete valves	5% of population of each type & size
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		ITEM DESCRIPTION	QUANTITY
	6.2	Reduction gear operator (Gate/Globe/Butterfly)	10% of population of each type & size
	6.3	Flap/door with pin(NRV)	10% of population of the each type & size
	6.4	Disc (butterfly/globe)	5% of population of each type & size
	6.5	Gate (Gate valve)	5% of population of each type & size
	6.6	Stem (all types)	5% of population of each type & size
	6.7	Seal rings (all types)	10% of population of each type & size
	6.8	Flap rings (NRV)	10% of population of each type & size
	6.9	Gaskets	10% of population of each type & size
	6.10	Bearing (Butterfly valve)	10% of population of each type & size
	6.11	Motorized actuator	1 No. of each size
	7.0	BASKET STRAINERS / Y-TYPE STRAINERS FOR HVW/MVW SYSTEM	
	7.1	Strainer elements with O-rings and stiffeners.	
	7.1.1	Basket strainer	20% of population of each type & size
	7.1.2	Y- Type strainer	20% of population of each type & size
	8.0	MVW SPRAY SYSTEM	
	8.1	Spray Nozzles	5% of population of each type & size
	8.2	QB Detectors	5% of population of each type
	9.0	HVW SPRAY SYSTEM	
	9.1	Spray nozzles	5% of population of each type & size
	9.2	QB Detectors	5% of population of each type
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		ITEM DESCRIPTION	QUANTITY
	10.0	HYDRANT VALVE	
	10.1	Hydrant valve complete (internal) single headed with instantaneous female coupling	20% of population
	10.2	Hydrant valve complete (external) single headed with instantaneous female coupling	20% of population
	10.3	Water monitor sets with nozzle branch pipe etc.	5% of population
	10.4	Spindle with nuts of Hydrant valve	10% of population
	10.5	Bonnet, gland nut, rubber assembly of hydrant valve	10% of population
	10.6	Seat, check nut, washer assembly of hydrant valve	10% of population
	10.7	Rubber washer for female coupling	10% of population
	10.8	Instantaneous female coupling assembly complete for hydrant valve	10% of population
	10.9	Lock pin assembly for hydrant valve	10% of population
	11.0	FIRE DETECTORS	
	11.1	Multisensor detectors (Addressable)	10 Nos.
	11.2	Response indicator for multisensor detectors provided above false ceiling	5 Nos.
	11.3	LHS cable for cable galleries	500 mtr
	12.0	PORTABLE EXTINGUISHERS	
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		ITEM DESCRIPTION	QUANTITY
	12.1	Water type	10% of each type
	12.2	Foam Type	10% of each type
	12.3	CO ₂ Type	10% of each type
	12.4	Dry Chemical Type	10% of each type
	13.0	MOBILE EXTINGUISHERS	
	13.1	Foam type	10% of each type
	13.2	CO ₂ Type	10% of each type
	13.3	Dry Chemical Type	10% of each type
	14.0	INERT GAS EXTINGUISHING SYSTEM	
	14.1	Nozzles	2 Nos. of each size/type
	14.2	Automatic & Manual release system	1 No. of each size/type
	14.3	Cylinder valve with safety pressure relief device	1 No. of each size/type
	14.4	Flexible hoses (if applicable)	5 Nos. of each size/type
	14.5	Solenoid coils	2 Nos. of each size/type
	15.0	FIRE ALARM PANEL & REPEATER FIRE ALARM PANEL	
	15.1	Power supply modules	2 Nos. of each type & rating whichever is more
	15.2	Processor modules, Control modules, loop cards modules, isolator cards	2 No. of each type
	15.3	LCD display of each type unit of panel	1 No.
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		ITEM DESCRIPTION	QUANTITY
	15.4	Interface unit / modules for non-addressable devices, auxiliary / output relay modules, control modules, supervisory control modules and any other electronic modules	10 No. of each type
	15.5	Power supervision relay	4 Nos. of each type.
	15.6	Fire screen / alarm buzzer	1 No. of each type
	16.0	ELECTRICAL	
	16.1	Electrical Actuator	10% or 1 No. of each type, model and rating whichever is more.
	16.2	Bearings of Motors (HT/LT)	1 Sets for each type & rating
	16.3	Motors (HT/LT)	1 No of each type & rating
	17.0	CONTROL AND INSTRUMENTATION	
	17.1	MEASURING INSTRUMENTS	
	17.1.1	Process Actuated Switch Devices : (All types of Pressure, diff. pressure, flow, temperature, level switch devices).	2 Nos. of each type and model
	17.1.2	All type of Electronic Transmitters and Ultrasonic Transmitters including sensors.	2 Nos. of each type and model
	17.1.3	Limit switches for isolation valves	2 Nos. of each type
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		ITEM DESCRIPTION	QUANTITY
	18.0	PROCESS CONNECTION PIPING (For Impulse Piping / Tubing and Air Supply Piping as Applicable)	
	18.1.1	Valves	1 No. of each type, class, size and model.
	18.1.2	2 way, 3 way, 5 way valve manifolds (as applicable)	2 No. of each type, class, size and model.
	18.1.3	Fittings	5 No. of each type, class, size and model whichever is more.
	19.0	CABLES	
	19.1.1	Pre-fabricated cable with connectors (as applicable)	1 No. of each type, size and model.
	19.1.2	Other cables (including core cable, short-term fire proof cable, fiber optic cables, etc.)	500 meters of each type, pair/ core and size
	20.0	PLC CONTROL SYSTEM	
	20.1.1	Power Supply Unit	1 No. of each type and model,
	20.1.2	Electronic modules (I/O modules, communication modules and any other module used in the system)	1 No. of each type and model, whichever is more.
	20.1.3	Central Processor Unit	1 No. of each type and model
	20.1.4	Interconnecting Cables (as applicable)	10% of each type & size
	20.1.5	Cooling Fan in PLC system / cabinet	2 Nos.
	21.0	24V – DC POWER SUPPLY SYSTEM	
	21.1.1	CTs, CVTs, VTs, chokes, AC/DC isolators, contactors, timers, relays (as applicable)	2 Nos. of each type and rating
	21.1.2	Fuses of each type and rating	2 Nos. of each type and rating
	21.1.3	Fuse free Circuit breakers	2 Nos. of each type and rating
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CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS 		
4.00.00		ITEM DESCRIPTION	QUANTITY
	21.1.4	Electronic modules of all types	1 No. of each type
	21.1.5	Cooling Fans (as applicable)	1 No. of each type
	21.1.6	Relays of all types including overload relays (as applicable)	2 Nos. of each type and rating
	21.1.7	Batteries	2 nos. of each type & rating
	<u>VENTILATION SYSTEM</u>		
	1.0	Filters	10% of each type & size
Notes :		<p>1. Wherever set is mentioned, one set of the spares of that item shall be for complete replacement of that particular item for one equipment.</p> <p>2. Any fraction of a item shall mean the next higher integer.</p> <p>3. Wherever quantity has been specified as percentage (%), the quantity of mandatory spares to be provided by contractor shall be the specified percentage (%) of the total population of the plant. In case the quantity so calculated happens to be fraction, the same shall be rounded off to next higher whole number.</p> <p>4. Unless stated otherwise a 'set' means items or sub-items required for each type/size range of the assembly/sub-assembly, required for complete replacement in one unit. It is further, intended that the assembly/sub-assembly which have different orientation (like left hand or right hand, top or bottom), different direction of rotation or mirror image positioning or any other reasons which result in maintaining two different sets of the spares to be used for the subject assembly/sub-assembly, these</p> <p>5. shall be considered as different types of assembly/sub-assembly.</p>	
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CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS 		
	ANNEXURE-IB		
	<u>LIST OF MANDATORY SPARES</u>		
	<u>ELECTRICAL:</u>		
1.00.00	132 KV SWITCHYARD		
	Sr. No.	Description	Qty
	A	Switchyard (GIS)	
	1.00.00	Switchyard 132kV GIS	132 kV
	1.01.01	SF6 Gas Pressure Relief Devices of each type along with O-Rings	3nos
	1.01.02	SF6 gas gauge cum switch or Density monitors and pressure switch as applicable of each type	5% of total population (Max 5nos and min,1no)
	1.01.03	Coupling device of each type for pressure gauge cum switch for connecting Gas handling plant	2sets
	1.01.04	Rubber Gaskets, "o" rings and Seals for Sf6 gas of each type of Circuit Breaker, Disconnecter and other GIS equipment's .	3sets
	1.01.05	Molecular filter for Sf6 gas with filter bags	5% of total weight
	1.01.06	All type of control valves for Sf6gas of each type	3nos
	1.01.07	SF6 gas cylinders of 50kgs / cylinder	20% of total gas quantity
	1.01.08	Locking device to keep the Dis-connectors and Earthing switches in close or open position in case of removal of the driving mechanism (If applicable	3nos
	1.01.09	Spares for Local control cabinet: MCB, fuses, timers, Aux Relay of each type & rating, terminals of each type (Set)	2sets
	1.01.10	UHF PD sensors of each type	5% of total population(max 5nos and min 1no)
	1.01.11	Bus Support insulator / gas Barrier of each type along with associated contacts and shields	5nos
	1.01.12	SF6 to air bushing of each type & rating along with conductor and enclosure for 1 phase enclosure	1no
	1.01.13	All types of Corona shield (3 Nos. of each type)	1set
	1.02.00	GIS Circuit Breaker (132KV)	
	1.02.01	One complete pole (1phase unit) of circuit breaker including CSD/Closing resistor, grading capacitor(as applicable), of each type & rating complete with , interrupter, main circuit , enclosure and marshalling Box with operating Mechanism to enable replacement of any type / rating of CB by spare	1no of each type & rating)
	1.02.02	Tripping coils assembly with resistors as	2 sets
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		applicable r (3nos of each type)			
	1.02.03	closing coil assembly with resistor as applicable (3nos of each type)	2sets		
	1.02.04	Relays, Power contactors, push buttons, timers & MCBs etc of each type & rating(If applicable)	1set		
	1.02.05	Aux. switch assembly, 3 Nos. of each type	1set		
	1.02.06	Operation counter, 3 nos. of each type	1set		
	1.02.07	Window scope/ Observing window, 3 Nos. of each type (if applicable)	1set		
	1.02.08	Spare of Hydraulic operated mechanism if Applicable : Spare of hydraulic operated mechanism Hydraulic operating mechanism with drive Motor of each type – 1 no. Ferrules and joints & couplings of each type – 1 Set Hydraulic Filter of each type – 1 Sets High Pressure Hose of each type– 1 Set N2 accumulator of each type– 2 No. Pressure Transducers – 1No. Valves of each type – 1 Set Orings, gaskets and seals – 1 Set Pressure gauges with coupling device of each type – 1 Set Hydraulic oil – 20% of total used quantity in substation Limit switch – 1 no. of each type Pipe length (Copper & steel) of each size & type -1set Pressure switch of each type -2nos Pressure Relief device of each type -1set	1 Set for each type of Circuit Breaker		
	1.02.09	Complete Spring operating Mechanism including charging mechanism etc of each type & rating	1 Set		
	1.02.10	Spring charging motor of each type & rating	2nos		
	1.03.00	GIS Disconnecter(132KV)			
	1.03.01	Complete set of 3 nos. of single phase / one 3-ph isolator of each type , dimension , current & voltage rating including main circuit , enclosure , driving mechanism and support insulator etc to enable replacement of any type / rating of isolator by spare	1set		
	1.03.02	Complete set of 3 nos. of single phase / one 3-ph Maintenance earthing switch of each type , dimension , current & voltage rating including main circuit , enclosure , driving mechanism and support insulator etc to enable replacement of any type / rating of isolator by spare	1set		
	1.03.03	Complete set of 3 nos. of single phase / one 3-ph Fast earthing switch of each type , dimension , current & voltage rating including	1 Set		
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		<p>main circuit , enclosure , driving mechanism and support insulator etc to enable replacement of any type / rating of isolator by spare</p> <p>1.03.07 Open/ close contactor assembly, timers, key interlock , interlocking coils, relays , push buttons indicating lamps , power contactors, resistors, fuses MCBs & drive control cards etc for one complete MOM box (3-lh gang operated or 1-ph unit) disconnecter and (3ph) earthing switch of each type and rating for one complete (3phase) disconnecter and earthing switch of each type & rating (if applicable</p> <p>1.03.07.1 For isolator</p> <p>1.03.07.2 For Maintenance Earth switch</p> <p>1.03.07.3 For Fast Earthing switch</p> <p>1.03.08 Limit switches and Aux. switches for complete 3-phase equipment</p> <p>1.03.08.01 For isolator</p> <p>1.03.08.02 For Maintenance Earth switch</p> <p>1.03.08.03 For Fast Earthing switch</p> <p>1.03.08.04 Drive Mechanism of each type</p> <p>1.03.09.00 For isolator</p> <p>1.03.09.01 For Maintenance Earth switch</p> <p>1.03.09.02 For Fast Earthing switch</p> <p>1.04.00 GIS Current Transformers (132KV)</p> <p>1.04.01 Complete CT, of each type and with enclosure to enable replacement of any type / rating of CT as spare</p> <p>1.05.00 GIS Voltage Transformers (132KV)</p> <p>1.05.01 Complete VT of each type and with enclosure to enable replacement of any type / rating of VT as spare</p>	<p>3 set</p> <p>1set</p> <p>1set</p> <p></p> <p>3set</p> <p>1set</p> <p>1set</p> <p></p> <p>1set</p> <p>1set</p> <p>1set</p> <p></p> <p>1no of each type/ rating</p> <p></p> <p>1no of each type / rating</p>	
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2	VOLUME III SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS	Page 69 of 95

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	1.06.00	GIS Surge Arrestor (132KV		
	1.06.01	Complete Surge Arrestors of each type and with enclosure with surge monitor counter to enable replacement of any type / rating of VT as spare	1no of each type / rating	
	1.06.02	Surge Monitor and counter of each type / rating	2 no of each type / rating	
	1.07.00	132 KV Air to SF6 bushing for Transformers & reactor as applicable for each type & rating	1no of each type / rating	
	1.08.00	132 KV Air to cable termination Kit SF6 bushing for Transformers & reactor as applicable for each type & rating	1no of each type / rating	
	1.09.00	Control switching device along with Transducers, sensors, contactors, switches etc	1 set of each make	
	B	Switchyard AIS Spares		
		Switchyard AIS Spares	132KV	
	1.11.00	Surge Arrestors		
	1.11.01	Surge Arrestor complete in all respects with terminal connector etc.	3no of each type & rating	
	1.11.02	Surge counter/Monitor	5 Nos of each type & rating	
	1.12.00	Capacitor Voltage Transformer complete in all respects including terminal connectors etc.	3nos of each type & rating	
	1.13.00	Bus Post Insulator Assembly (Complete)	3 Nos of each type & rating	
	1.14.00	Clamps and connectors (Minimum 3 Nos. of each type)	10% of total population	
	1.15.00	Spacers and corona bells.	(Minimum 3 nos. of each type)	
	1.16.00	String Insulators and associated hardware's	3nos of each type	
	1.17.00	Disc Insulators	5% of the total number of discs of each voltage class installed at the switchyard	
	1.18.00	Long Rod insulator	5% of the total number of insulators of each voltage class installed at the switchyard subject to a min 3nos of insulators of each voltage class.	
	1.19.00	Cable Sealing End Complete in all respects including terminal connectors etc.	2 nos.	
	1.20.00	Disconnectors AIS (132KV)		
	1.20.01	One complete pole of each type of HCB /VCB isolator with 1 E/S & 2E/S along with operating mechanisms, support insulators etc and terminal connector but without support structure	3 nos of each type & rating	
	1.20.02	Isolator Arms with finger contacts and current carrying assembly	1set	
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	1.20.03	Relay, power contactors, switch fuses, timers, key interlock pushbutton switch , auxiliary switches for electrical control circuit	1set
	1.20.04	Limit switch & aux. switch	3 set of each type & rating
	1.20.05	Terminal Pads and connectors	2set
	1.20.06	Rotary Bearing for Isolator	1set
	1.20.07	Motor with gear assembly and bevel gear assembly	1no
	1.20.08	Coronal shield rings	3nos
	1.20.09	Hinge pins	3no
	1.20.10	Copper contacts fingers for male & female contacts	2set
	1.20.20	Support insulators	1set
	1.20.21	Fuses of each rating	5nos
		Note: 1Set Means for complete replacement of Disconnecter. i.e The spares required for Three (3)poles or Three (3)phases.	

	1.21.00	SPARES FOR GIS HALL EOT CRANES		
	1.21.01	MECHANICAL ITEM SPARES FOR CRANES		
		i) Bearing for long travel wheels	1 Set	
		ii) Bearing for cross travel wheels	1 Set	
		iii)Bearing for Gear boxes	1 Set	
		Main hoist	1 Set	
		C.T.	1set	
		L.T.	1 Set	
		One set of bearing consist of all the bearing used in one gear box		
		iv)Brake liner for all the brakes		
		a) Main Hoist	1 Set	
		b) E.M. Brake	1 Set	
		c) E.M. Thruster brake	1 Set	
		One set of liner consists of 2 Nos. liners used on each brake		
		v)Oil seal for gear boxes		
		a) Main Hoist	1 Set	
		b) C.T.	1 Set	
		c) L.T.	1 Set	
		One set of oil seal consists of all the seals used in the one gear box.		
	VI	Brake springs for main hoist		
		E.M. Brake	1 Set	
		E.M. Thruster brake	1 Set	
	1.21.02	ELECTRICAL ITEM SPARES FOR GIS HALL EOT CRANES		
	I	Carbon bushes and brush holder for motors		
		a)	Main hoist	1 Set
		b)	C.T.	1 Set
		c)	L.T.	1 Set
	II	Solenoid Coils for EM brakes		
		a)	Main hoist	1 Set

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	b)	C.T.	1 Set
	c)	L.T.	1 Set
	III)	Overload relays for motors	
	a)	Main hoist	1 Set
	b)	C.T.	1 Set
	c)	L.T.	1 Set
	IV)	Limit switches for	
	a)	Main hoist	1 Set
	b)	C.T.	1 Set
	c)	L.T.	1set
	Note:- 1 SET= requirement for 1 crane		

2.00.00


SAS


S.no.	SAS Including GRPs	
1	Bay Control unit (complete with all components)	2 No.
2	Numerical Relays comprising various bay protection units, busbar (Both CU and PU), and GRP	2 No. of each type
3	Operator workstation (OWS)/ Engineering Workstation (EWS) along with software, monitor, mouse, keyboard, printer etc.	1 No.
4	Complete Network Controller / Server along with software	1 No.
5	Gateways	1 No. of each type
6	Modem/Firewall (as applicable)	2 no. of each type
7	Terminal Blocks	20 nos. of each type, make, model and rating
8	Relays other than numerical relays	10% of each type of total population (min 1 no.)
9	GPS equipment	1 set comprises hardware Modules of each type
10	protocol converters (applicable as per scheme) for SAS application	2 set
11	Interface cables containing standard length of each type of cable and its connector for each type of peripheral	2 Sets
12	MCBs	2 No. of each type, make and model used in the system
13	LIU of OFC including necessary connectors	2 no. of each type
14	ABT Energy Meter – 0.2s	2 No. of each type
15	Cards/Modules of generator DR, line DR (if	1 No. of each type


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		stand-alone)	
	16	Transducers	2 no. Of each type
	17	Auxiliary CT/PT (including 100% Stator Earth fault CT and IVTs for GRP)	1 no. Of each type

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	<table><tr><th>S. No</th><th>ITEMS DESCRIPTION</th><th>TT</th><th>GT</th><th>Aux. Trans. (for each rating)</th></tr><tr><td>1.</td><td>HV Bushing with metal parts and gaskets (See Note 1)</td><td>3 No.</td><td>3 No.</td><td>3 No.</td></tr><tr><td>2.</td><td>HV Neutral bushing with metal parts and gaskets</td><td>2 No.</td><td>2 No.</td><td>1 No. (if applicable)</td></tr><tr><td>3.</td><td>Not Used</td><td>-</td><td>-</td><td>-</td></tr><tr><td>4.</td><td>LV bushing with metal parts and gaskets (See Note 1)</td><td>3 No.</td><td>3 No.</td><td>3 No.</td></tr><tr><td>5.</td><td>LV Neutral bushing with metal parts and gaskets</td><td>1 No. (if applicable)</td><td>-</td><td>1 No</td></tr><tr><td>6.</td><td>WTI with contacts</td><td>2 No.</td><td>2 No.</td><td>1 No.</td></tr><tr><td>7.</td><td>OTI with contacts</td><td>2 No.</td><td>2 No.</td><td>1 No.</td></tr><tr><td>8.</td><td>Pressure relief device</td><td>2 No.</td><td>2 No.</td><td>1 No. (if applicable)</td></tr><tr><td>9.</td><td>MOG</td><td>2 No.</td><td>2 No.</td><td>1 No.</td></tr><tr><td>10.</td><td>Buchholz relay complete</td><td>2 No.</td><td>2 No.</td><td>1 No.</td></tr><tr><td>11.</td><td>Oil surge relay</td><td>2 No</td><td>2 No.</td><td>-</td></tr><tr><td>12.</td><td>Set of gaskets (See Note 2)</td><td>1 Set</td><td>1 Set</td><td>1 Set</td></tr><tr><td>13.</td><td>Set of valves</td><td>2 No. of each type/size</td><td>2 No. of each type/size</td><td>2 No. of each type/size</td></tr><tr><td>14.</td><td>Cooler fan with motor</td><td>2 No.</td><td>-</td><td>-</td></tr><tr><td>15.</td><td>Not used</td><td>-</td><td>-</td><td>-</td></tr><tr><td>16.</td><td>Not used</td><td>-</td><td>-</td><td>-</td></tr><tr><td>17.</td><td>Set of OLTC/OCTC contacts</td><td>1 Set (OLTC)</td><td>1 Set (OLTC)</td><td>-</td></tr><tr><td>18.</td><td>Air cell for conservator</td><td>1 No.</td><td>1 No.</td><td>1 No. (if applicable)</td></tr></table>	S. No	ITEMS DESCRIPTION	TT	GT	Aux. Trans. (for each rating)	1.	HV Bushing with metal parts and gaskets (See Note 1)	3 No.	3 No.	3 No.	2.	HV Neutral bushing with metal parts and gaskets	2 No.	2 No.	1 No. (if applicable)	3.	Not Used	-	-	-	4.	LV bushing with metal parts and gaskets (See Note 1)	3 No.	3 No.	3 No.	5.	LV Neutral bushing with metal parts and gaskets	1 No. (if applicable)	-	1 No	6.	WTI with contacts	2 No.	2 No.	1 No.	7.	OTI with contacts	2 No.	2 No.	1 No.	8.	Pressure relief device	2 No.	2 No.	1 No. (if applicable)	9.	MOG	2 No.	2 No.	1 No.	10.	Buchholz relay complete	2 No.	2 No.	1 No.	11.	Oil surge relay	2 No	2 No.	-	12.	Set of gaskets (See Note 2)	1 Set	1 Set	1 Set	13.	Set of valves	2 No. of each type/size	2 No. of each type/size	2 No. of each type/size	14.	Cooler fan with motor	2 No.	-	-	15.	Not used	-	-	-	16.	Not used	-	-	-	17.	Set of OLTC/OCTC contacts	1 Set (OLTC)	1 Set (OLTC)	-	18.	Air cell for conservator	1 No.	1 No.	1 No. (if applicable)				
S. No	ITEMS DESCRIPTION	TT	GT	Aux. Trans. (for each rating)																																																																																																
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17.	Set of OLTC/OCTC contacts	1 Set (OLTC)	1 Set (OLTC)	-																																																																																																
18.	Air cell for conservator	1 No.	1 No.	1 No. (if applicable)																																																																																																
<p>Note 1: Each mandatory spare RIP bushing shall be provided with suitable "stand ".</p> <p>Note 2: 1 set consists of gaskets required for 1 No. transformer for the following</p> <div>(a) protection and monitoring devices (b) cooler circuit (c) largest inspection cover, if applicable</div>																																																																																																				
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	(d) HV/LV turret, if applicable (e) OLTC inspection cover, if applicable Note 3: 1 set consists of quantities required for 1 complete transformer																																															
4.00.00	Busducts:																																															
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CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS 		
		(if applicable)	
	2.00	Circuit Breaker	
	2.01	Complete Circuit Breaker 1 phase pole of each type & rating complete with interrupter, main circuit and enclosure with operating mechanism	3 Sets
	2.02	Trip Coil assembly with resistor as applicable, 3 Nos. of each type	2 Sets.
	2.03	Closing Coil assembly with resistor as applicable, 3 Nos. of each type	2 Sets.
	2.04	Relays, Power contactors, push buttons, timers & MCBs etc of each type & rating(If applicable)	1 Set
	2.05	Closing assembly/ valve, 3 nos. of each type (If applicable)	2 Sets.
	2.06	Trip assembly/ valve, 3 nos. of each type (If applicable)	2 Sets
	2.07	Aux. switch assembly, 3 Nos. of each type	1 Set
	2.08	Operation counter, 3 nos. of each type	1 Set
	2.09	Rupture disc, 3 Nos. of each type (If applicable)	1 Set
	2.10	Spare of pneumatic/spring/hydraulic operated mechanism (as per Main Supply) 1)Spare of pneumatic operated mechanism(complete) a. Motor for compressor – 1 no. b. Pressure switch and valve etc – 1 no. of each type 2)Spare of spring operated mechanism(complete) a . Motor – 1 no b. Limit switch etc– 1 no. of each type 3)Spare of hydraulic operated mechanism(complete) a. Motor – 1 no. b. Limit switch – 1 no. of each type	1 Set for each type of Circuit Breaker
	3.00	Disconnecter	
	3.01	Complete set of 3 nos. of single phase disconnector including main circuit, enclosure and driving mechanism	1 Set
	3.02	High speed/ fast acting fault making grounding switch, 3 nos. of single phase of each rating, including main circuit, enclosure and driving mechanism	1 Set
	3.03	3 nos. of single phase Earthing switch including main circuit, and driving mechanism	1 Set
	3.04	Open/ close contactor assembly, timers, key interlock for one complete (3phase) disconnector and earthing switch of each type & rating (if applicable)	1 Set
	3.05	Limit switches and Aux. switches for complete 3-phase equipment	
		a) For Disconnector	3 Sets
		b) For earth switch	1 Set
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2	VOLUME III SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS Page 76 of 95

CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS		
		c) For High speed earth switch	1 Set
	3.06	Relays. Power contactors, resistors, fuses, push buttons, timers & MCBs (Complete for one 3 phase equipment) if (If applicable)	
		a)For Disconnecter	3 Sets
		b)For earth switch	1 Set
		c)For high speed earth switch	1 Set
	4.00	Current Transformer	
	4.01	Complete CT, as applicable, with enclosure, as applicable, 1 no. of each type & rating	1 Set
	5.00	Voltage Transformer	
	5.01	Gas Insulated complete VT with enclosure	1 Set
	6.00	SF6 Gas Insulated Surge Arrestor with enclosure	3 Nos.


6.00.00

LT Switchgears & LT Busducts

S. No.	Item Description	Quantity
1	Complete breaker of each rating	8 Nos.
2	Numerical Relays of each type	4 Nos.
3	Auxiliary Relays of each type	8 Nos
4	Horizontal busbar support Insulators	8 Nos
5	Vertical busbar dropper support insulators	8 Nos
6	Current transformer of each type & ratio	3 Nos.
7	Voltage transformer of each type & ratio	3 Nos.
8	Control supply transformer of each type & rating	3 Nos.
9	Power Contactor of each type and rating	5 Nos.
10	Coil for above contactor for each type and rating	5 Nos.
11	MCCBs (equally divided for all ratings)	40 Nos.
12	MPCBs (equally divided for all ratings)	40 Nos.
13	Closing coil of each type of each rating	5 Nos.
14	Trip coil of each type of each rating	5 Nos.


CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS			
	15	Aux contact set of each type and Rating	5 Sets.	
	16	Fixed contact set of each type & rating	3 Sets.	
	17	Moving contact set of each type & rating	3 Sets.	
	13	Maintenance tools and accessories for maintenance of LT MCC	2 Nos.	
7.00.00	DC BATTERY			
	S. No.	Item Description	Quantity	
	1	Complete dry cell	5% or 10 Nos. whichever is more for each set of battery bank	
	2	Inter-cell connectors with Hardware	5% or 5 Nos. whichever is more for each set of battery bank	
	3	BHMS Spares	5% of installed capacity	
8.00.00	BATTERY CHARGER			
	S. No.	Item Description	Quantity	
	1	Set of Electronic Cards / Modules	1 set of each type & rating	
	2	Set of Auxiliary relays	1 set of each type & rating	
	3	Set of Fuse Links and Glass Fuses	3 set of each type and rating	
	4	3 phase Rectifier Bridge complete assembly	1 set of each type and rating	
	5	Rectifier Transformer	1 No. of each type & rating	
	6	Control Transformers	1 No. of each type & rating	
9.00.00	DIESEL GENERATOR SET			
	S.No.	Item description (AS APPLICABLE)	Quantity	
	1.	Gaskets & packing	1 set	
	2.	Valve springs	1 set	
	3.	Fuel pump complete	1 set	
	4.	Fuel nozzles and needles	1 set	
	5.	Piston, complete with rings and rod	1 set	
	6.	Piston rings(for each engine)	1 set	
	7.	Flow and temperature relay of each type used	1 set	
	8.	Main and end bearing shells for the diesel engine	1 set	
	9.	Battery charging rectifier diodes	4 Nos.	
	10.	Complete rotating rectifier assembly for alternator	1 set	
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2	VOLUME III SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS	Page 78 of 95

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	53.	Voltage regulator complete	1 set	
	54.	Switches	1 No. of each type & rating	
	55.	Power contactors	2 No. of each type & rating	
	56.	Auxiliary contactors	1 No. of each type & rating	
	57.	DC starter assembly with clutch engaging and disengaging arrangements complete with motor	1 No.	
	58.	Coil for contactor (for both power and Auxiliary contactors)	2 No. of each type & rating	
	59.	Timer	1 No. of each type & rating	
	60.	Auxiliary relays	1 No. of each type & rating	
	61.	Current transformers	1 No. of each type	
	62.	Voltage transformers	1 No. of each type	
	63.	Battery charging rectifier diodes	4 Nos.	
	64.	Fuses	6 No. of each type & rating	
	65.	Start/Stop push buttons	2 No. of each type & rating	
	66.	Indication lamps	20%	
	67.	Indication lamp holders	10%	
	68.	On/Off isolator	1 No.	
	NOTE: 1SET MEANS COMPLETE REQUIREMENT OF ONE DG			

10.00.00 LIGHTING


	1	LED Fixture complete along with driver , LED lamps etc. each tye & rating offered	2% of total qty or 2nos which ever more	
	2	Lighting Panels		
	i)	Timers 24 hours	3 Nos	
	ii)	Power Contactors of each type & rating	5nos	
	Hi)	Auxiliary contactors od each type & rating	5nos	
		Rotary switches (Ammeter, voltmeter, Manual / Auto , Local / remote selector switches etc)of each type & rating	5nos	
		Indicating lamps & holders (RED, Green , Yellow etc) complete of each type & rating	20nos	
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2	VOLUME III SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS	Page 80 of 95


CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS 		
		On / Off Isolators of each type & rating	5nos
		MCCBs of each type & rating	5nos
		MCB/RCCB/RCBO of each type & rating	10nos
	3	20A receptacles complete with Plugs etc	10nos
	4	Lighting Junction Boxes of each type	25nos
	5	63A welding receptacles complete with Plug etc	5nos
	6	Volt meter of each type & size	2nos
	7	Ammeter of each type & size	2nos
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2	VOLUME III SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS Page 81 of 95


CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS		<div>एनटीपीसी NTPC</div>																																																			
	ANNEXURE: IC																																																					
1.00.00	MANDATORY SPARES LIST FOR CONTROL AND INSTRUMENTATIONS																																																					
	CONTROL SYSTEM																																																					
	<table><tr><th>SI No</th><th>ITEM</th><th>QUANTITY</th></tr><tr><td>1.</td><td>HMI Devices</td><td></td></tr><tr><td>A)</td><td>Workstation</td><td></td></tr><tr><td></td><td>(i) OWS with licensed software</td><td>1 no. of each type and model</td></tr><tr><td></td><td>(ii) Server / Programming station with licensed software</td><td>1 no. of each type and model</td></tr><tr><td></td><td>(iii) Keyboard</td><td>2 no. of each type and model</td></tr><tr><td></td><td>(iv) Mouse</td><td>4 no. of each type and model</td></tr><tr><td>B)</td><td>Network Components</td><td></td></tr><tr><td></td><td>(i)Switch/repeaters/hubs/firewalls for PLC/ DDCMIS including Station LAN etc.</td><td>2 nos. of each type and model</td></tr><tr><td></td><td>(ii) Any other device/equipment not covered under above items but required to make system complete.</td><td>2 nos. of each type and model</td></tr><tr><td>2.</td><td>Cables and Connectors.</td><td></td></tr><tr><td></td><td>(i)Prefab interconnecting cables with connectors</td><td>2 no. of each type and length.</td></tr><tr><td></td><td>(ii)System bus cable with connectors</td><td>2 no. of each type and length.</td></tr><tr><td></td><td>(iii)I/O bus cable with connectors for remote I/O units</td><td>2 no. of each type and length.</td></tr><tr><td></td><td>(iv)Loose Connectors</td><td>5 nos. (sets) of each type</td></tr><tr><td>3.</td><td>Power Supply Modules & Power Packs for control system</td><td>20% or 2 nos. of each type model and rating, whichever is more.</td></tr><tr><td>4.</td><td>Electronic modules of each type and model for control system, Data communication system, Master and Slave Clock etc. (This shall include all type of cards like I/O cards, Remote I/O cards, communication/Interface cards, controller cards, CPU module</td><td>20% or 2 Nos of each type, model and rating whichever is more</td></tr></table>	SI No	ITEM	QUANTITY	1.	HMI Devices		A)	Workstation			(i) OWS with licensed software	1 no. of each type and model		(ii) Server / Programming station with licensed software	1 no. of each type and model		(iii) Keyboard	2 no. of each type and model		(iv) Mouse	4 no. of each type and model	B)	Network Components			(i)Switch/repeaters/hubs/firewalls for PLC/ DDCMIS including Station LAN etc.	2 nos. of each type and model		(ii) Any other device/equipment not covered under above items but required to make system complete.	2 nos. of each type and model	2.	Cables and Connectors.			(i)Prefab interconnecting cables with connectors	2 no. of each type and length.		(ii)System bus cable with connectors	2 no. of each type and length.		(iii)I/O bus cable with connectors for remote I/O units	2 no. of each type and length.		(iv)Loose Connectors	5 nos. (sets) of each type	3.	Power Supply Modules & Power Packs for control system	20% or 2 nos. of each type model and rating, whichever is more.	4.	Electronic modules of each type and model for control system, Data communication system, Master and Slave Clock etc. (This shall include all type of cards like I/O cards, Remote I/O cards, communication/Interface cards, controller cards, CPU module	20% or 2 Nos of each type, model and rating whichever is more		
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GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2	VOLUME III SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS																																																			
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CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS		
2.00.00		or Card, logic cards, etc.)	
	5.	Bus coupler/Interface hardware / other communication devices.	20% of each type and model or minimum 2 nos which ever is more.
	6.	Relays	10% of each type and model or minimum 2 nos which ever is more
	7.	Isolators	10% of each type and model or minimum 2 nos which ever is more
	8.	Batteries used for battery backup of RAMs (If applicable)	10% of each type and model or minimum 2 nos whichever is more
	9.	Fuses	200 % of each type and rating
	10.	Cooling fans for Power supply and cabinets.	10 % of each type and model
	11.	Intelligent mini-UPS for workstation server, PCs, L3 switch. (if applicable)	1 no. of each size and rating
2.00.00	MEASURING INSTRUMENTS		
	Sl. No.	ITEM	QUANTITY
	1	AAQMS (SO₂, NO_x, CO, Dust monitoring)	
	(i)	Analyzer for SO ₂ , NO _x , CO, Dust monitoring	1 no. complete instrument of each type and model
	(ii)	Electronic Card Assemblies/PCBs, power supply modules	10% of each type and model
	(iii)	Set of Gaskets/"O" rings/ seals	200% of each type, model, rating and size
	(iv)	Heater Assembly:-	20% of each type and model
	(v)	Temp. Sensor	20% of each type and model
	(vi)	Solenoids	2 nos. of each type, model and rating
	(vii)	Filters, light source, etc.	100% of each type, model and rating
	(viii)	Calibration gases, calibration cell and other consumables for calibration: - of all types and ranges.	One year supply.
	(ix)	Pump repair kit (If applicable)	One set
	2. (I) CEMS (SO_x, NO_x, CO): -		
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CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS		<div>एनडीवीसी NTPC</div>
	(a)	Analyzer for SOx, NOx, CO	1 no complete instrument of each type and model.
	(b)	Flue gas flow measurement	1 no. complete instrument along with sender/receiver unit
	(c)	Electronic card assembly/ PCBs, moisture/condensate monitor, power supply modules	10% of each type, model and rating
	(e)	Set of gaskets/O-rings/ seals	200% of each type, model, rating and size
	(f)	Temp. Sensor	20% of each type and model
	(g)	Heater assembly, Cooler assembly	20% of each type and model
	(h)	Complete Probe with shield assembly (Not applicable for Insitu-path)	1 no. of each type and model
	(i)	Solenoids	2 nos. of each type, model and rating
	(j)	Filters, light source, sensor, detector, etc.	200% of each type, model and rating
	(k)	Calibration gases, Calibration cell and other consumables for calibration: - of all types and ranges.	One year supply
	(l)	Heavy duty blower assembly	1 no. of each type, size and rating.
	(m)	Rotameter/Air flow meter	2 nos. of each type, model and rating
	3	Measuring Instruments	
	a)	Transmitters	
	(i)	Transmitters of all type, range and model no. (For the measurement of Pressure, differential pressure flow, level, temperature etc.)	10%- of each type and model
	(ii)	Interface modules at field (between field transmitter & DDCMIS) like Zener barrier, power supply isolator, isolater (as applicable) etc.	10% of each type
	b)	Temperature elements	
	(i)	RTD's	10% of each type and length
	(ii)	Thermocouples	10% of each type and length
	3.00.00	POWER SUPPLY SYSTEM	
3.01.00	Uninterrupted Power supply (UPS) System including Static Switches for Sub Distribution		
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CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS			
4.00.00	INSTRUMENTATION CABLE, CONTROL CABLE, INTERNAL WIRING			
	SI No	ITEM	QUANTITY	
	(i)	Prefabricated cable of each type (other than DDCMIS application) (if applicable)	10% of installed quantity.	
	(ii)	Prefabricated cable connector (other than DDCMIS application) (if applicable)	10% of each type and model	
	(iii)	Other cables (Instrumentation and Control cable)	5% or 500 mtrs whichever is more for each type, pair and size of actual supplied quantity.	
5.00.00	CCTV			
	SI No	Item	Quantity	
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CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS 		
6.00.00	(i)	Camera	10% of each type or 2 nos. which ever is more
	(ii)	Full function keyboard & Joystick	1 no.
	(iii)	Client Workstations with monitor	1 no.
	(iv)	Network Switches	10% of each type, make, model etc.
	(v)	Camera/Database Server	1 no.
	(vi)	Mechanism motors	10%
	(vii)	Media Converters	10%
	(viii)	Camera mounting arrangement.	10% of each type or 2 nos. which ever is more
6.00.00	PROCESS CONNECTION PIPING (FOR IMPULSE PIPING/TUBING, SAMPLING PIPING/TUBING AND AIR SUPPLY PIPING AS APPLICABLE)		
	Sl. No.	ITEM	QAUNTITY
	(i)	Valves of all types	10%
	(ii)	2 way, 3 way, 5 way valve manifolds	10% of each type, class, size and model
	(iii)	Fittings	10%
	(iv)	Purge meters	5% of each model
	(v)	Filter regulators	20% of each model
7.00.00	ELECTRIC ACTUATORS		
	Sl. No.	ITEM	QAUNTITY
	(i)	Actuator	1 no. of each type & rating
	(ii)	Electronic PCB of all types	10% of each type & model
	(iii)	Absolute Encoder (replaceable part)	5% of each type & model
	(iv)	Electronic Torque sensor	5% of each type & model
8.00.00	CONTROL VALVES, ACTUATORS AND ACCESSORIES		
	Sl. No.	ITEM	QAUNTITY
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2	VOLUME III SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS
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CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS 	
	(i)	Pneumatic Control Valve actuator assembly 10% or 1 Nos. of each type, model and rating, whichever is more.
	(ii)	Diaphragms, O' rings, seals etc. 100% of all types, make etc.
	(iii)	Pressure Gauges of all types, make, rating etc.(if applicable) 10% or 2 nos. of each type whichever is more.
	(iv)	Solenoid valves (if applicable) 10% or 2 nos. of each type whichever is more.
	(v)	Control valve positioners/smart positioners and its accessories 10% or 2 nos. of each type, model and rating, whichever is more.
	(vi)	E/P converters (if applicable) 10% or 2 nos. of each type, model and rating, whichever is more.


9.00.00 PUBLIC ADDRESS SYSTEM


9.01.00 Call Stations & Amplifiers

Sr. No.	Item	Quantity
(i)	Call station for outdoor area with amplifier	10 % of each type, make, model etc.
(ii)	Call station for indoor area desktop mounting type with amplifier	10 % of each type, make, model etc.
(iii)	Master Control Unit (MCU)	10 % of each type, make, model etc.
(iv)	Portable Call station with minimum 2 mtrs connecting cable.	10 % of each type, make, model etc.
(v)	Standalone amplifier	10 % of each type, make, model etc.

9.02.00 Loudspeakers

Sr. No.	Item	Quantity
(i)	Outdoor Industrial horn type loudspeaker	10 % of each type, make, model etc.
(ii)	Indoor wall mounted cone type loudspeaker	10 % of each type, make, model etc.

CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS 		
	<p>Note:</p> <ol style="list-style-type: none"> 1. Refer Part-A Sub-Section-VI (Mandatory Spares) for general requirements and interpretation of various terms and conditions. 2. In case the main population of any item is only one no., then the spare quantity shall also be one no., overriding requirements indicated in above clauses. 3. Wherever the quantity is given only in percentage, the spare quantity shall be distributed into various ranges/size/rating/type (as the case may be) in the same proportion of the main population. For the quantities coming less than 1, shall be treated as 1 only. 4. C&I mandatory spares if covered under other chapters of Section VI, Part F of technical specification are not required to be repeated. 		
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	<p>ANNEXURE ID</p> <p><u>MANDATORY SPARES FOR ROOF TOP SOLAR PV</u></p> <p>Bidder shall maintain following mandatory spares, consumables & various components of Solar PV plant for smooth running . The bidder shall also mention the source of supply.</p> <ol style="list-style-type: none"> Solar PV module - 1% of total population Inverter - 1 No of string inverter of highest size of supplied capacity. Flexible Solar DC cable – 500 m. DC side Surge Arrestor, If applicable – 1 No <p>Wherever quantity has been specified as percentage (%) and the quantity of mandatory spares works out to be a fraction, the same shall be rounded off to next higher whole number.</p>		
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LIST OF TOOLS & TACKLES

A. Mechanical:


S.No.	Item Description	Size	Qty.
1.	Box wrenches	10-11	02 nos.
2.	Box wrenches	12-14	02 nos.
3.	Box wrenches	13-17	02 nos.
4.	Box wrenches	19-22	02 nos.
5.	Box wrenches	30-32	02 nos.
6.	Box wrenches	24-27	02 nos.
7.	Engineers wrench	10-11	02 nos.
8.	Engineers wrench	12-14	02 nos.
9.	Engineers wrench	13-17	02 nos.
10.	Engineers wrench	19-22	02 nos.
11.	Engineers wrench	24-27	02 nos.
12.	Engineers wrench	30-32	02 nos.
13.	Engineers wrench	36-41	02 nos.
14.	Engineers wrench	46-50	02 nos.
15.	Combination wrench	AL36	02 nos.
16.	Key for hexagon socket screw	4	02 nos.
17.	Key for hexagon socket screw	5	02 nos.
18.	Key for hexagon socket screw	6	02 nos.
19.	Key for hexagon socket screw	8	02 nos.
20.	Key for hexagon socket screw	10	02 nos.
21.	Key for hexagon socket screw	12	02 nos.
22.	Key for hexagon socket screw	14	02 nos.
23.	Key for hexagon socket screw	17	02 nos.
24.	Bit, hexagon socket screw 1/2" squ	6	02 nos.
25.	Bit, hexagon socket screw 1/2" squ	8	02 nos.
26.	Bit, hexagon socket screw 1/2" squ	10	02 nos.
27.	Bit, hexagon socket screw 3/4" squ	14	02 nos.
28.	Bit, hexagon socket screw 3/4" squ	19	02 nos.
29.	Socket wrench 1/2" square drive	10*12.5	02 nos.
30.	Socket wrench 1/2" square drive	13*12.5	02 nos.
31.	Socket wrench 1/2" square drive	17*12.5	02 nos.
32.	Socket wrench 1/2" square drive	19*12.5	02 nos.
33.	Socket wrench 1/2" square drive	24*12.5	02 nos.
34.	Socket wrench 1/2" square drive	13*12.5L	02 nos.
35.	Socket wrench 1/2" square drive	24*12.5L	02 nos.
36.	Socket wrench 3/4" square drive	41*20L	02 nos.
37.	Socket wrench 3/4" square drive	30*20	02 nos.
38.	Torque wrench	20-100Nm	02 nos.
39.	Torque wrench	75-400Nm	02 nos.
40.	Torque wrench	150-800Nm	02 nos.
41.	Ratchet handle with 3/4" in square	3/4"-553	02 nos.
42.	Ratchet handle with 3/4" in square	B12.5	02 nos.
43.	Speed brace	B12.5*500	02 nos.
44.	Extension bar	B12.5*250	02 nos.
45.	Adapter socket wrench	A20*12.5	02 nos.
46.	Swivel head	3/4"-554	02 nos.
47.	Pliers for securing ring	A40	02 nos.

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	48.	Screw driver	2*12	02 nos.
	49.	Tool locker	TLR-1200	02 nos.
	50.	Stud remover	5-20	02 nos.
	Tools for main bearing:			
	51.	DOG for main bearing		01 no.
	52.	DOG for thrust bearing		01 no.
	Tools for cylinder liner:			
	53.	Lifting tools		01 no.
	54.	Honing tool for deglazing of cyl. Liner		01 no.
	55.	Tool for removing antip. ring		01 no.
	56.	Grinding tool for liner and cyl. Head S+		01 no.
	Tools for piston:			
	57.	Lifting tool for piston		01 no.
	58.	Piston ring pliers 320		01 no.
	59.	Fitters tool for piston		01 no.
	60.	Pliers for retaining rings ZGJ-5+ZSJ51		01 no.
	61.	Jack for piston		01 no.
	Tool for connecting rod:			
	62.	Mounting and Dismounting tools for conn. Rod .Big		01 no.
	63.	Tool for connecting rod		01 no.
	64.	Limiter for piston		01 no.
	Hydraulic tightening tools for connecting rod:			
	65.	Hydraulic tighten. Tool for M27*2 screw		02 nos.
	66.	Mounting tool 5033 4V80D0032		01 no.
	67.	Pin for tight of M27*2 nuts		01 no.
	68.	Assembly tool for intermediate gear		01 no.
	Tools for cylinder head:			
	69.	Lifting tool		01 no.
	70.	Device for engine valves 5032 1V12		01 no.
	71.	Turning tool for grinding of valves		01 no.
	72.	Extractor for start and inj. Valve		01 no.
	73.	Adapter		01 no.
74.	Valve clearance feeler		01 no.	
75.	Extraction tool for injection valve		01 no.	
76.	Extraction mandrel for valve guide		01 no.	
77.	Lifting tool for rocker arm assembly		01 no.	
Tools for injection equipment(If Applicable):				
78.				
79.	Socket 05020036(56-36) 36		01 no.	
80.	Open-end wrench(change over)		01 no.	
81.				
82.	Moving tool 5004 2V35A1568		01 no.	
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	83.	Lifting device 6002 2V16F0124		01 no.
	84.	Tool for conn. Piece flan. Screw		01 no.
	85.	Extraction tool 6002 2V16L0644		01 no.
	86.	Part digital depth gauge W. data O 150MM		01 no.
	87.	Base single extension base 180MM		01 no.
	88.	Bracket for nozzle removal		01 no.
	89.			
	Tools for hydraulically tension M42 screw connection:			
	90.	Hydraulic tightening tool M42		02 nos.
	91.	Distance bush for hydraulic tool		02 nos.
	92.	Pin for tensioning tool		01 no.
	93.	Extraction for M42 stud		01 no.
	94.	Distance sleeve for tightening of		02 nos.
	95.	Elbow union for tightening tool		02 nos.
	Tools for hydraulically tensioned M80 screw connection:			
	96.	Hydraulic tool for camshaft and interme		01 no.
	97.	Support 5001 2V13L0113		01 no.
	98.	Mounting and removal Tool F. Stud		01 no.
	99.	Fastening arm for hydraulic Tool M80X6		01 no.
	100.	Lifting device for hydraulic tool		01 no.
	Tools for hydraulically tensioned M60 screw connection:			
	101.	Hydraulic tightening tool		02 nos.
	102.	Hydraulic cylinder		04 nos.
	103.	Extractor tool		01 no.
	104.	Pin		01 no.
	105.	Lifting tool		01 no.
	106.	Lifting tool for hydraulic cylinder		01 no.
	High pressure pump(1000 bar):			
	107.	Hydraulic pump 1000 bar		01 no.
	108.	Hose assembly for tightening tool L=820		02 nos.
	109.	Hose assembly for tightening tool		03 nos.
	Low pressure pump(150 bar):			
110.	Low pressure handpump		01 no.	
111.	Hose, low pressure pump		02 nos.	
Miscellaneous tools:				
112.	Mounting tool		01 no.	
113.	Hydraulic cylinder		01 no.	
114.	Pressure testing device		01 no.	
115.	Deflection indicator		01 no.	
116.	Locking plate		08 nos.	
117.	Securing pin		16 nos.	
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CLAUSE NO.	SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS			<div>एनटीपीसी NTPC</div>																																											
		<table><tr><td>118.</td><td>Lifting eye bolt</td><td></td><td>01 no.</td></tr><tr><td>119.</td><td>Lifting eye bolt</td><td></td><td>01 no.</td></tr><tr><td>120.</td><td>Wrench</td><td></td><td>01 no.</td></tr><tr><td>121.</td><td>Inhex socket 17X20(59-17)</td><td></td><td>01 no.</td></tr><tr><td>122.</td><td>Ring spanner</td><td></td><td>01 no.</td></tr><tr><td>123.</td><td>Extractor plate</td><td></td><td>01 no.</td></tr><tr><td>124.</td><td>Extractor</td><td></td><td>01 no.</td></tr><tr><td>125.</td><td>Tool</td><td></td><td>01 no.</td></tr><tr><td>126.</td><td>Mounting tool</td><td></td><td>01 no.</td></tr><tr><td>127.</td><td>Pressure testing device</td><td></td><td>01 no.</td></tr><tr><td>128.</td><td>Pump</td><td></td><td>01 no.</td></tr></table>	118.	Lifting eye bolt		01 no.	119.	Lifting eye bolt		01 no.	120.	Wrench		01 no.	121.	Inhex socket 17X20(59-17)		01 no.	122.	Ring spanner		01 no.	123.	Extractor plate		01 no.	124.	Extractor		01 no.	125.	Tool		01 no.	126.	Mounting tool		01 no.	127.	Pressure testing device		01 no.	128.	Pump		01 no.	
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	27	Complete set of screw drivers and nut drivers suitable for working in relay panels	3 nos.
	28	Fully automatic digital megger (0-15 kV)	2 nos.
	29	Maintenance tools and accessories for maintenance of LT MCC	2 nos.
	30	Maintenance tools and accessories for maintenance of HT MCC	2 nos.
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2	VOLUME III SCOPE OF SUPPLY & SERVICES, TERMINAL POINTS AND EXCLUSIONS Page 95 of 95




PART-A
VOLUME – IV
PLANT PERFORMANCE AND DESIGN
PHILOSOPHY


CLAUSE NO.	PLANT PERFORMANCE AND DESIGN PHILOSOPHY			
1.00.00	<p>GENERAL</p> <p>The plant shall be complete in all respects and shall include all the equipment, systems and plant services necessary for safe, reliable and trouble free operation in the operating regimes and duty conditions specified in the Technical Specifications. Design of the plant shall take into account convenience of access, ease of maintenance, operational flexibility, the latest applicable statutory regulations/ safety codes and the climatic conditions particular to the site.</p> <p>Broad design requirements for the power plant are as follows:</p> <ul style="list-style-type: none"> a. Plant Type : RLNG fired open cycle Engine Power plant. b. Engine : Suitable for 50 Hz Electric Power Generation Applications. c. Design Reference conditions for guaranteed performance : As per Clause 3.01.01, Volume-IV, Part A. f. Operating Capability : Base Load, Cyclic Loading and Daily start/stop g. Fuel : RLNG h. NOx Emission level : As per Clause 6.02.00, Volume-IV, Part A. i. Cooling Water Cycle : Close cycle with Radiator cooling <p>Detailed design requirement for the plant is specified in this Volume. Detailed equipment specification shall be as per the respective Chapters of Part – B of Technical Specifications.</p>			
2.00.00	<p>PLANT CONFIGURATION AND PLANT CAPACITY</p> <p>Configuration: Genset modules to meet plant net capacity in the range of (108 ±5 MW) with 10 to 24 numbers of engine. Out of total number of engines commissioned in 2029, maximum 2 number of identical engines shall cumulatively meet capacity of 12 ± 3 MW. Balance capacity to meet (108 ± 5 MW) shall be with identical engines complying to above installation schedule. The 2 number (maximum) of gensets meeting (12 ± 3 MW) shall be selected in such a way that transporting weight of each genset along with trailer/trolley shall not exceed 100 Tons.</p> <p>Note: All the supplied engines shall be compatible to fire 20 to 25% Hydrogen by volume and same shall also be demonstrated during shop test of all engines.</p> <p>Capacity Installation phasing: The total project capacity shall be (108 ±5 MW) which shall be installed as per following schedule:</p> <ul style="list-style-type: none"> 1st Year (2029) – (84 ±5) MW 2nd Year (2030) – (12 ±3) MW 3rd Year (2031) – 0 MW 4th Year (2032) – Balance capacity to meet net plant capacity of 108 ±5 MW 			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2	VOLUME- IV	PAGE 1 OF 32


CLAUSE NO.	PLANT PERFORMANCE AND DESIGN PHILOSOPHY			
	<p> P_G = Gross Output of a Genset as defined above $P_A = P_U + P_C/n + T_L$ P_N, P_A, P_U, P_C, T_L and n are as given below- </p> <p> P_N = Net Output of a Genset. Further, Net Plant Power output shall be calculated by summing the net power output of individual engines. </p> <p> P_A = Auxiliary Power Consumption per Genset </p> <p> P_U = All unit specific auxiliaries required to run one Genset. </p> <p> P_C = Power consumption of all common plant auxiliaries and services including transformer losses (except Generator Transformer), excluding the standby auxiliaries/services, for operation of the complete station. </p> <p> T_L = Transformer loss of corresponding Generator Transformers. </p> <p>Note : Transformer losses shall be considered as per following (as applicable)-</p> <ol style="list-style-type: none"> GT - 100% no load loss, 54% of Copper losses. All Other Transformers - 100% no load loss & 25% of Copper losses. <p> n = Number of Genset Modules offered. </p> <p>For arriving Net Power of each engine, all integral and associated auxiliaries of the Genset shall be in service. Further, following common auxiliaries of the plant shall be in service -</p> <ol style="list-style-type: none"> Common cooling water system Air conditioning & Ventilation (HVAC). Duty factor shall be 1.0 for 24 hours operational HVAC system and 0.5 for 12 hours operational HVAC system. Compressed air system and Start-up air system (Duty Factor = 0.6 for both) Lube oil purification system Any other continuously operating equipment/system required for functioning of the Genset. <p>The power consumption P_U of entire unit auxiliaries shall be measured at respective feeders.</p> <p>The power consumption P_C shall be measured at the incomers of respective common auxiliary system or the feeders of individual equipment.</p> <p>In case any equipment mentioned in common auxiliary system or unit auxiliary is not required to be operated during the test, shop test power consumption at duty point shall be considered.</p> <p>In case shop test power consumption for equipment/ system mentioned above is not available, then rated power consumption of the equipment/system shall be taken into account while calculating Net Power Output.</p> <p>The bidder shall furnish a list of equipment to be covered under Auxiliary power consumption, which will be subject to employer's approval.</p>			
<p>GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW \pm 5 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2</p>	<p>VOLUME- IV</p>	<p>PAGE 3 OF 32</p>	


CLAUSE NO.	PLANT PERFORMANCE AND DESIGN PHILOSOPHY			
3.03.00	<p>Net Heat Rate</p> <p>Net Heat Rate on LHV basis of a Genset shall be computed as follows:</p> <p>Guaranteed Net Heat rate of each Genset = [Fuel consumption X Net/lower calorific value of Fuel] ÷ Net power Generation by the Genset.</p> <p>Where:</p> <p>Fuel Consumption in SCM/Hour</p> <p>Net/ lower calorific value of fuel in Kcal/SCM</p> <p>Power Generation in kW</p>			
3.04.00	<p>Correction Curves</p>			
3.04.01	<p>Performance test of each Engine (output & Heat rate) shall be calculated during PG tests at Site. During evaluation of Performance Guarantee Test results, corrections shall be applicable only for following:</p>			
a.	Methane Number RLNG fuel			
b.	Power Factor			
c.	Frequency			
	<p>Bidder in their bid shall furnish the certified correction curves for above parameters for correcting the Net Output and Net Heat Rate of the each Genset along with their Bid documents.</p>			
3.04.02	<p>Only certified correction curves, submitted with the Techno Commercial Offer and accepted by the Employer, shall be used for evaluation of Performance Acceptance Test results. Any subsequent submission of performance correction curves shall not be acceptable.</p>			
3.04.03	<p>Bidder shall also furnish all such correction curves that may be required either for establishing demonstration guarantees or for performance assessment of individual equipment for the purpose of performance monitoring during operational stage of the plant. List of such curves shall be finalized during detailed Engineering.</p>			
4.00.00	<p>MODE OF OPERATION, START UP, GOVERNING MODE, AND PLANT LIFE</p>			
4.01.00	<p>Mode of Operation</p>			
4.01.01	<p>Each Genset shall be designed to operate as a Base/Full load and Part load generating unit. Genset shall also be suitable for frequent start and stop mode of operation. However, capability to meet the requirements and withstand stresses of cyclic load variations and partial/ full load rejections shall be built in the plant. Specific design features to permit the above operational flexibility shall be provided. Genset units shall be designed to withstand rapid load changes within the frequency band of 47.5 – 51.5 Hz without any restriction.</p>			
4.01.02	<p>The Bidder shall clearly bring out in his offer the various design considerations proposed by him to meet the above requirement and ensure that under such operating conditions as given above, no part/ component of the plant shall be stressed beyond the acceptable safe thermal stress and fatigue levels to get a life of 25 years for the plant.</p>			
<p>GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE</p>		<p>TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2</p>	<p>VOLUME- IV</p>	<p>PAGE 4 OF 32</p>


CLAUSE NO.	PLANT PERFORMANCE AND DESIGN PHILOSOPHY			
4.01.03	All equipment, including Engine and Generators/Alternators shall be designed to withstand frequency variation in 47.5 – 51.5 Hz frequency range.			
4.01.04	Start-up criterion for Genset Module (i) Each Genset shall be capable of delivering its full rated output within 5 minutes from Stand-by hot condition (meeting the pre-set Lube oil temperature, Cooling water temperature & Start-Up air pressure as per Engine OEM standard requirements). Start-up command to the Engine Module shall be considered as datum on the time scale. (ii). Gensets shall be capable of absorbing the transitory temperature gradients after rapid start and immediate restart. It shall be possible to start and synchronize Genset units at any grid frequency within the frequency band of 47.5 - 51.5 Hz without any restriction.			
4.01.05	<p>All Equipment/ Systems shall be designed to provide flexibility in operation as specified. The Bidder should clearly bring out in detail the 'Plant Operation Philosophy' proposed for the entire plant meeting the above requirements. In order to enable the Employer to verify the above, the 'Plant Operation Philosophy' shall include write-ups for following:</p> <p>a. Genset Module Start-up (including preparations) - different start up modes as per standard proven practice of OEM</p> <p>b. Base Load and Part Load operation</p> <p>c. Load Rejection</p> <p>d. Genset Module Shutdown</p> <p>e. Prolonged outage (lay-off)</p> <p>Important operational aspects and limitations (if any) to be considered during each of the above-mentioned operating regimes shall be furnished.</p>			
4.02.00	Plant Life			
4.02.01	The plant shall be designed for a minimum operating life of 25 years for the operating capabilities and duty specified in these specifications. Bidder shall confirm in his offer that all plant components are designed adequately for this lifetime. If there are any items of the plant on which this lifetime cannot be confirmed, the life of such items and the reasons for the same shall be stated in the offer.			
4.02.02	Plant Maintenance during Commissioning/Initial operation Period The Contractor shall ensure presence of Genset OEM's experts during all scheduled and unscheduled inspections, without prejudice to the contractor's liabilities in terms of other provisions under the Contract including guarantees and post-commissioning services. Contractor shall be responsible for all scheduled and un-scheduled inspections and maintenance activities of the complete plant. The Contractor shall be responsible for all expenses towards services and materials required for all such Inspections and repairs/replacements. Owner/Client shall only be responsible for the availability of Fuels within the plant premises during above period.			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2	VOLUME- IV	PAGE 5 OF 32


CLAUSE NO.	PLANT PERFORMANCE AND DESIGN PHILOSOPHY		<div>एनडीपीसी NTPC</div>																
4.02.03	<p>Responsibilities during Supervision period (1 year)</p> <p>The supervision of O&M period shall commence after takeover of the plant post successful completion of initial/trial operations & Performance guarantee tests including Demonstration tests of initial 84 MW (whichever occurs later).</p> <p>The contractor shall ensure the complete presence of OEM expert (1 operation and 1 maintenance) during this period who will be responsible for day-to-day operations and routine maintenance activities. Contractor shall be responsible for guidance during all scheduled and un-scheduled inspections and maintenance activities of the complete plant.</p> <p>The experts shall be responsible for bringing the unit from startup to full load (including complete plant startup related activities) safely. He shall be responsible for training the employer's executive for operating the power plant under all circumstances (full-load, Part-load and technical minimum). He shall be able to train employer's executive for all types of startups, shutdown and all emergency condition that may arise during normal operation of plant. Also, during any emergency or unit tripping, the responsibility of shutting down the unit safely lies with the contractor.</p>																		
4.03.00	<p>Capabilities for variations in Ambient/ Operating and Fuel Properties</p>																		
4.03.01	<p>The Plant shall be designed for trouble free and reliable operation within the following range of operating and ambient conditions:</p> <table><thead><tr><th></th><th>Design Reference</th><th>Range of Variation</th></tr></thead><tbody><tr><td>Ambient Temp. (DBT)</td><td>28 °C</td><td>14.6 to 36.1 °C</td></tr><tr><td>Barometric Pressure</td><td>1001.8 mbar</td><td>996.9 to 1014 mbar</td></tr><tr><td>Relative Humidity (RH)</td><td>80 %</td><td>65 % to 100 %</td></tr><tr><td>Grid Frequency</td><td>50 Hz</td><td>47.5 to 51.5 Hz</td></tr></tbody></table> <p>Other variations indicated in Project Information and specified in Technical Specifications (Part B) shall be duly considered in the overall design of the plant.</p>					Design Reference	Range of Variation	Ambient Temp. (DBT)	28 °C	14.6 to 36.1 °C	Barometric Pressure	1001.8 mbar	996.9 to 1014 mbar	Relative Humidity (RH)	80 %	65 % to 100 %	Grid Frequency	50 Hz	47.5 to 51.5 Hz
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4.03.02	<p>Design and sizing of Engines, Electric Generators/Alternators, Cooling Systems, various mechanical and electrical auxiliaries and other balance of plant (BOP) equipment shall be not be constraint, whatsoever, for achieving the 100% base/full load output at all conditions within the specified range of operating conditions.</p> <p>However, in case of frequency variation, the output shall not be less than that indicated in the capability curve.</p>																		
4.03.03	<p>RLNG composition range indicated in Project Information (Annexure-IA, Volume – II, Part A) is the fuel. Engine and support systems shall be designed and sized to accept RLNG of any composition within the specified range. Equipment/ systems required to provide the above flexibility is included in Bidder's scope of supply.</p>																		
4.04.00	<p>Reliability, Availability and Maintainability</p>																		
4.04.01	<p>Design, Redundancy, Plant layout and Maintenance Practices in respect of all the components of the plant shall be such as to achieve good Reliability, Availability and Maintainability throughout the Plant Life.</p>																		
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2	VOLUME- IV	PAGE 6 OF 32															


CLAUSE NO.	PLANT PERFORMANCE AND DESIGN PHILOSOPHY			
4.04.02	Redundancy level in plant equipment and systems shall be such as to support operation of the plant in all specified modes of operation. Where redundant (standby) equipment is provided, the standby equipment shall be capable of automatic and immediate initiation in to operation upon failure of one or more of the running equipment. Necessary instrumentation and controls to sense the failure of running equipment and initiation of standby equipment shall be provided.			
4.04.03	The Bidder shall necessarily include in his offer the Inspection/ Maintenance Guidelines for Engines, Generators/Alternators, pumps, motors and other associated equipment installed in the plant to ensure min. 90% plant availability.			
4.05.00	<p>Design requirements for conductance of Periodic Performance Tests</p> <p>In addition to the initial Acceptance Tests to be conducted by the Contractor, the Employer would be conducting periodic Performance Tests for Gensets and their associated individual equipment/ systems. The Bidder shall duly consider the requirements for instrumentation accuracy (as per applicable test codes), recalibration requirements of on-line Instruments, location of plant instrumentation (to be used for testing) and provision for installation of temporary test instrumentation and design the systems and equipment accordingly.</p>			
5.00.00	CYCLE REQUIREMENT AND DESIGN CRITERION OF POWER PLANT EQUIPMENT			
5.01.00	General			
5.01.01	The offered plant shall be complete in all respects for safe and reliable operation for the operating regimes and duty conditions specified. Considering the conditions particular to the site e.g. coastal location, high humidity round the year and heavy rainfall, necessary design attention shall be given to protect the installation against corrosion and mitigate the effect.			
5.01.02	The two (02) gensets with cumulative capacity of (12 ± 3 MW) shall be identical to each other and balance gensets to meet complete capacity of (108 ± 5 MW) shall be identical to each other in respect of performance, sizing, equipment design and interchangeability of equipment and subassembly or component of an equipment.			
5.01.03	Each Genset shall be independent in all respects i.e. part or full outage of a particular Genset shall not hamper trouble free sustained operation of the remaining Gensets in any way, whatsoever.			
5.01.04	The design criterion specified here in the following paragraphs pertains to the project specific requirements in respect of sizing and configuration. Equipment specification shall be as per respective chapters of Part – B, Section – VI.			
5.02.00	Genset & Support Systems			
5.02.01	Gensets shall be capable of trouble free and sustained continuous operation at all ambient and operating conditions specified.			
5.02.02	The plant site is in the close vicinity of sea, accordingly Air Intake Filtration System of Engines and all other equipment shall be designed to ensure that maximum level of NaCl and the treated air does not exceed the maximum allowable value. Airborne salt concentration shall be considered as typical for a tropical coastal location for the climatological conditions specific to the plant site.			
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5.02.03	<p>Further, the complete system of the power plant shall be designed to withstand local climate conditions (plant located close vicinity of sea) and other climatic conditions specific to the site.</p> <p>The design philosophy of all the Genset auxiliaries shall be as per the standard proven practices of the Original Equipment Manufacturer (OEM) of Genset & all drawings/ documents shall be vetted by the Genset OEM during execution stage</p>			
6.00.00	ENVIRONMENTAL REQUIREMENTS			
6.01.00	<p>Noise Levels</p> <p>The noise levels shall meet the guidelines as enclosed at Annexure-IA of Volume-IV, Part-A, Section-VI.</p>			
6.02.00	NOx Emission Limits			
6.02.01	<p>The Guaranteed NOx level (on dry volume basis corresponding to 15% excess oxygen in flue gas) for each Engine shall be as follows:</p> <p>RLNG - less than 80 ppm</p> <p>Above specified guaranteed NOx emission level for each Engine shall be demonstrated at different loads varying between 50% and 100% of the design output rating of the Engine at specified site reference conditions.</p> <p>Emission shall meet the standards notified for NO_x from Gas/ Naphtha Based TPP published vide notification dated 22.12.1998 by MoEF under E (P) Rules.</p>			
6.02.02	<p>NOx guarantee shall be for the Total NOx which is defined as summation of NOx formed by Oxidation of atmospheric nitrogen in the combustion air (thermal NOx + prompt NOx) and NOx formed from the nitrogen chemically bound in the fuel (FBN). If the fuel specification given in Project Information Chapter does not indicate FBN, typical representative value shall be suitably considered by the Bidder and shall be indicated in the Offer.</p>			
6.02.03	<p>NOx Control equipment shall be designed to achieve the above specified NOx level in all ambient conditions specified.</p>			
6.02.04	<p>Online NO_x, SO₂, and CO monitoring of exhaust gas at each stack outlet shall be provided.</p>			
6.03.00	Liquid Effluents			
6.03.01	<p>All liquid effluents emanating out of the power plant shall be treated (as required) to meet the Environmental Standards for Gas Naphtha-based Thermal Power Plants published by MOEF vide notification dated 22.12.1998 and General Standard for Discharge of Environment Pollutants, Part-A: Effluents Published by MOEF dated 19.05.93 & also the latest MoEF&CC notification for discharge standards for effluents dated 13.10.2017 under E(P) Rules & its amendment thereof, applicable for discharge in Inland Surface Waters, whichever are more stringent.</p> <p>The discharge standards to be followed are enclosed at Annexure-II (A) & Annexure-II (B). The treated effluents shall also meet quality requirements of CPCB, if more stringent than the standard mentioned in technical specifications.</p>			
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6.03.02	Devices for measurement of pH, Turbidity, Conductivity, and Flow at the point of liquid effluent discharge out of the plant shall be installed.			
7.00.00	FUEL HANDLING SYSTEM			
7.01.00	Gaseous Fuel Handling System			
7.01.01	RLNG is envisaged as the fuel for the project. Properties of the gaseous fuel envisaged for the project is indicated in Project Information, Part-A, Volume-II, Section-VI of Technical Specification. Employer shall arrange the gas within the premises of power plant. Bidder shall connect the gas supply line with incoming line terminated inside the plant boundary. Further, Bidder shall ensure the gas parameters and quality as per the requirement of his engines. Any modifications/equipment/systems required to meet the gas parameters and quality shall be under bidder's scope.			
8.00.00	DESIGN CRITERION FOR PIPING SYSTEMS			
8.01.00	Design, fabrication, assembly and testing of pipes, fittings, flanges, piping components, valves and specialties, thermal insulation, etc. shall generally conform to the requirements of ASME B 31.1 and other relevant ASME standards.			
8.02.00	Design basis for 'Piping' shall be as per Part B of Technical Specification.			
8.03.00	All over ground pipes (Cooling Water, gaseous fuel, fire-fighting etc.) shall be provided with suitable protection against the corrosive coastal atmosphere.			
9.00.00	Fire Detection and Protection System			
9.01.00	General Design Criteria <ul style="list-style-type: none"> i) The fire protection system shall consist of fire water storage tanks, fire water pumping system, fire water hydrant and spray system serving the whole station including plant/ facilities/ buildings. ii) All major equipment/ system components in the entire fire protection & detection system shall have the approval from one of the following: <ul style="list-style-type: none"> a) Underwriters Laboratories of USA b) LPCB –UK c) VDS d) BIS e) FM - USA iii) Any other additional equipment not specifically mentioned in the technical specifications but are found necessary to meet the requirements of TAC norms and also for safe and sound operation of the plant are to be included at no extra cost to Employer. iv) During normal operation period, whenever required, electric motor-driven fire water pumps shall run on A.C. power supply. However, in case of complete black-out conditions, DG set being provided is required to cater the load of electric motor driven fire water pumps so that fire protection system remains available during complete black-out conditions. The equipment to run on DG set are: 			
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9.02.00	<p>(a) One (1) no. main fire water pump</p> <p>(b) One (1) no. jockey pump</p> <p>v) During normal operation period, whenever required, electric motor driven fire water pumps shall run on</p> <p>vi) Fire water pipes shall not be routed below the bus duct in switchyard area.</p> <p>vii) Provisions for future connection with isolation gate valves shall be provided at strategic locations for further connection by Employer in future.</p> <p>Hydrant System</p> <p>Design philosophy (minimum requirement)</p> <p>i) Category of Hazard and minimum terminal pressure shall be as per TAC norms.</p> <p>ii) Fire water ring mains (at least two rings) shall be provided as per TAC norms with isolation valves (gate valves) between various ring mains. Ring mains shall be provided so that ring mains can be interconnected and water from any of the ring mains can flow to other mains.</p> <p>iii) At locations where water cannot reach through ground level hydrants, water monitors at required intervals shall be provided. In addition to above fire hydrant to be provided at 45 Meter. Risers for these hydrant valves shall be supported Further, fixed water monitors shall also be provided where elevation having elevation 15M or more.</p> <p>iv) All the landings of various buildings and other multi-storied structures of the plant shall be provided with hydrant landing valves. Further, Gate Valve shall be provided as isolation valve in each riser of internal hydrant system. Isolation Gate valve shall be provided for each water monitor.</p> <p>v) Each of the landing valves and external hydrant valves associated with the main plant, switchyard & transformer areas and other areas/building shall be provided with a hose box. Each hose box shall contain two (2) numbers of 15M long hoses & coupling, branch pipes & nozzles, spanner etc. as per TAC guidelines.</p> <p>For landing valves of various buildings, the hose box shall have two (2) numbers 7.5 m long hoses, branch pipes, couplings, nozzles, spanners, etc. as per TAC guidelines.</p>			
	<p>9.03.00 HVW & MVW Spray System</p> <p>Design Philosophy (Minimum Requirements)</p> <p>i) Design discharge density shall be as per the rules of TAC and/ or NFPA standards. Minimum running water pressure at any projector/spray nozzle shall be not less than 3.5kg/Sqcm and not greater than 5.0 kg/Sqcm for HVW spray system.</p> <p>For MVW spray system, minimum running water pressure at any projector/spray nozzles shall not be less than 2.8 bar for cable galleries and 1.4 bar for other areas.</p> <p>ii) Deluge valve along with trims like pressure gauge, water motor gong, etc. shall be UL/FM or equivalent approved / listed. The deluge valve (auto resetting type) assembly shall consist of accessories such as water motor gong, alarm test valves, drip/drain valves, strainers for these valves, hydraulic releasing system, solenoid valves, etc. Further, the design features and make of all the projectors / spray nozzles shall be UL/FM or equivalent approved / listed.</p>			
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9.04.00	<p>iii) A strainer ('Y' type) be provided at upstream of deluge valve. Each deluge valve shall be provided with isolation gate valves (with limit switch) upstream & downstream.</p> <p>Strainer wire shall be SS (AISI 316), 30 SWG, 30 mesh. Strainer area shall be at least 4 times the pipe cross section at the pipe inlet. Pressure drop across strainer in clean condition shall not exceed 1.5 kg/cm² at design flow of deluge valve. However, for areas/equipment where pressure available at inlet of deluge valve is very high, a higher pressure drops (up to 3.0 kg/cm²) may be considered across strainer to limit the pressure at remotest projector / nozzle as per the rules of TAC.</p> <p>iv) Pressure switches to be provided in spray and detector piping to exhibit "FIRE" and "SPRAY ON" annunciations and as well as for interlock.</p> <p>v) Wet type pipe detector network shall be provided for spray system using quartzoid bulb detectors.</p> <p>vi) Each outdoor deluge valve housing shall be provided with brick wall housing on three sides and RCC roof. The fourth side of the enclosure shall be in a direction away from protected equipment. Indoor deluge valve(s) which are within 6 meters of the protected equipment shall also be separated from the latter by a brick wall enclosure.</p> <p>vii) Remote manual operation of the deluge valves shall be possible from the respective fire alarm cum control panel through the keyboard operation of PC monitoring station when the system is selected in remote manual mode. The remote manual selection for the operation of spray system on any equipment or any zone shall also be through the monitoring station of the respective panel. Apart from the automatic operation of the deluge valve, the system shall have provision for manual operation of the deluge valve by means of hand operated lever close to the deluge valve assembly. There shall also be a provision to operate deluge valve electrically from a nearby local panel.</p>			
	<p>Fire Detection, Alarm and Control System</p> <p>Design Philosophy (Fire Alarm and Detection System)</p> <p>i. The PLC based panel at fire water pump house shall indicate the status of each pump, system pressure, operation of hydrant and/ or spray system, failure of starting of pumps, healthiness & failure of batteries/ chargers, main supply, low level of fuel oil of diesel engines, tripping of pumps, low level / very low level of water in the water supply system, status of batteries & chargers of panels and diesel engines etc. Alarms from these panels shall also be available to operator at central monitoring station of fire alarm system and DDCMIS.</p> <p>ii. The addressable type panel at Control equipment rooms shall receive signal from sensors from various areas/equipment of the respective units.</p> <p>iii. The central monitoring station to be located at main control room shall cover the fire detection and protection system of the complete (all the areas) plant. This shall give audio-visual annunciations for fire in each of the risk area / equipment / status of the fire protection system as well as system operator open / short circuit status of detector or control cabling etc. Further, this shall activate a hooter/sounder in each of the area provided with fire/smoke detection system.</p> <p>iv. Alarms from all the panels shall be repeated simultaneously in repeater panel at Fire station.</p>			
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	<p>v. The addressable panel shall evaluate the signals received from the detectors, transmit the fire or trouble alarms (audio-visual) to prearranged points, supervise and monitor the complete fire detection & extinguishing circuits, initiate control functions like shutdown of draft fans, air-conditioning and ventilation plant/equipment, closure of Fire dampers in A/C & Ventilation system etc. Opening smoke extraction vent, switching on smoke extraction equipment, emergency lighting, tripping of transformers, lockout relays, etc.</p> <p>vi. All the circuits from the detectors to the panels and the circuits from the panels to the actuating devices (such as solenoid valves, deluge valves, push buttons etc.) shall be closed loop type and shall be supervised for open and short circuiting. The trouble signal also be annunciated in the respective panels.</p> <p>vii. Facilities shall be provided on the fire alarm panel for simulating fire conditions, sensitivity adjustment, isolation of detectors etc. from the panel.</p>			
9.05.00	Total Flooding Inert Gas Extinguishing System			
9.05.01	Design Philosophy (Minimum Requirements)			
	<p>General</p> <p>a) Complete design and all critical components / equipment like cylinder, cylinder valve assembly, hoses, check valve, actuation controls, restrictor/pressure reducer, directional/selector valve, pressure relief device/safety valve, pressure gauge, pressure switch, nozzle, etc. shall be approved and listed by UL/FM /VDS /LPCB or equivalent.</p> <p>Basic design parameters of inert gas extinguishing system like type of inert gas agent, extinguishing/design concentration, safety factor, discharge time, etc. shall be considered in strict accordance with NFPA-2001 (latest edition). Piping design/layout, nozzle arrangement/orientation, etc. shall conform to UL/FM/VDS/LPCB or equivalent.</p>			
	<p>Agent Supply, Design Concentration, Quantity & Discharge time</p> <p>a) System shall be designed to meet the minimum requirements of total flooding inert gas extinguishing system as per NFPA 2001. However higher concentration may be used if it is specified by the agent manufacturer/ system supplier for the area protected.</p> <p>b) The complete volume of the rooms, including the above false ceiling, shall be considered for estimation of quantity of gas and containers.</p> <p>c) When determining the gas quantity, the leakage losses from the enclosure shall be taken into account by the supplier. Further volume of re-circulating type air conditioning system & its duct work (at least up to the automatic fire dampers of the ducts) shall be considered as a part of the total volume so that the design concentration is achieved throughout the hazard area. Further gas quantity shall be adjusted for ambient pressure & temperature conditions. Bidder to provide primary supply of gas & its cylinders, along with 100% (one hundred percent) standby / reserve gas quantity and cylinders for each room/area.</p>			
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	<p>d) However, if the system design permits provision of a common “ENGINEERED STORAGE SYSTEM” with directional valves for multiple rooms / areas of one unit, such a design is acceptable provided the total primary supply and/or reserve supply is equivalent to the requirement of largest area / room and such rooms /areas are perfectly separated from each other by means of wall / metal cladding or floor of minimum required fire rating. Such common storage system should have been listed & approved by UL/FM/VDS/LPCB or equivalent and bidder should produce documentary evidences for design and installation of such systems elsewhere in the past by them.</p> <p>e) In either of the case mentioned in above two clauses, both the main & reserve supply cylinders shall be permanently connected to the distribution piping through manifold and arranged for easy changeover from the panel. Suitable selector switches be provided for “Normal /Standby “supply selection.</p> <p>f) The discharge time period shall be such that the design concentration is achieved within time duration specified in NFPA-2001 (latest edition/amendment) The flow calculations shall establish this criterion.</p> <p>g) The quality of gas shall conform to relevant design standard such as NFPA – 2001(latest edition) or as specified by listing authorities.</p> <p>h) Clean agent discharge test shall be done for smallest inert gas protected zone.</p> <p>Storage containers</p> <p>a) The storage cylinders offered shall be of seamless type & brand new. Welded cylinders are not permitted.</p> <p>b) All the storage containers shall be provided under an enclosure. It shall not be kept open to atmosphere.</p> <p>c) The storage containers shall be securely installed as per the listed installation manual with a provision for convenient individual servicing and container weighing. Such servicing or weighing shall be possible without shutting down the system.</p> <p>d) Automatic means such as check valves shall be provided to prevent gas loss if the system is operated when any containers are removed for maintenance.</p> <p>e) The storage containers shall not be charged to a fill density or super pressurization level different from the manufacturer’s listing.</p> <p>f) The design pressure for storage cylinders shall be suitable for the maximum pressure developed at 55 degC and shall be designed to meet the requirements in NFPA-2001.</p> <p>g) All cylinders shall bear the marking as detailed out in NFPA -2001 and shall be duly listed by UL / FM /VDS/LPCB or equivalent in addition to approval by Chief Controller of Explosives - INDIA.</p> <p>h) The storage cylinders shall have accessories such as pressure gauges/ switches, liquid level indicators (if applicable), refilling connections, relief devices (if applicable) etc. A reliable means of indication other than weighing shall be provided to determine the pressure in cylinders.</p> <p>i) All the pressure gauges/switches, manifold connections etc. shall be easily removable for servicing / maintenance without any loss of gas.</p>			
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	<p>DISTRIBUTION</p> <p>a) Both main & reserve cylinders shall be permanently connected to the distribution piping through manifold and arranged for easy & auto changeover. Cylinder Manifold, directional valve manifolds, Piping, fittings & pressure relieving device shall be designed for the maximum design pressure of the system and shall conform to the requirements of NFPA -2001 (latest edition) or as specified by listing authorities. Material of construction for manifolds shall be as per listed design manual and shall be hydro-tested as per design manual or at 1.5 times the maximum design pressure, whichever is higher.</p> <p>b) Discharge nozzles along with deflector shields shall be listed for the intended use including the flow characteristics and area of coverage and quantity & design shall be such that complete quantity of gas is uniformly distributed throughout the hazard volume within the specified discharge time without disturbing the ceilings, lighting fixtures etc.</p> <p>c) The fire detection system to be employed shall be as specified elsewhere. Operating devices shall be by mechanical, electrical and pneumatic means conforming to NFPA-2001. The power supply to electrical actuators shall be backed up with reliable battery supply. Such batteries shall be charged automatically by battery chargers. Power supply be taken from the Fire detection /alarm system panels of the respective units. Required annunciations such as "Gas released", "Failure of automatic actuation" etc. shall be exhibited in the fire alarm panel.</p> <p>d) Where pilot cylinders are employed for actuation of the cylinder banks, the number of pilot cylinders shall be as per the listed design manual.</p> <p>e) Facility for manual release of gas through push buttons be provided along with selection facility of "Auto/Manual" from the panel.</p> <p>f) In addition to this, local manual release through lever operation shall also be provided near the cylinder banks.</p> <p>g) All manual-operating devices shall be identified to the hazard they protect by fluorescent paint.</p> <p>h) Manual abort switches shall be provided for each of the area/zone and the same shall be provided as per NFPA -2001 or as specified by listing authorities.</p> <p>i) The gas releasing devices at cylinder outlets shall be of re-usable type after discharge at any instant.</p> <p>j) Supervision of automatic actuation devices, power supply, manual actuation circuits, and complete wiring shall be provided through control system /panel and the healthiness shall be reported or indicated in the panel automatically. Complete control systems shall be listed and approved by UL/FM/ VDS/LPCB or equivalent.</p> <p>Design, Installation & Testing</p> <p>a) System design, specifications, working plans, flow calculations etc. shall be prepared in line with the NFPA-2001 or as specified by listing authorities and shall be approved by Employer. The system flow calculations shall be performed using a calculation listed or approved by UL/FM /VDS/LPCB or equivalent.</p> <p>b) Calculations shall be provided by the designer to prove that the area is not pressurized and extinguishing capability is not affected due to provided ventilation of that area. Bidder to provide additional ventilation arrangement if required.</p>			
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10.00.00 10.01.00	<div><div>c) After installation, the complete system shall be inspected and tested as per the recommendations of Chapter - 4 & relevant Clauses of Appendix-A of NFPA-2001. Wherever testing is mentioned at a regular frequency in these chapters, the bidder shall carry out initial testing and records shall be presented to Employer for approval of the installation.</div><div>d) Prior to handing over the system to Employer, the supplier shall provide operational training to Employer’s operating personnel which shall consist of control-system operation, trouble procedures, emergency procedures, safety requirements etc.</div><div>e) The complete installation, testing, commissioning & training shall be carried out by the Contractor under the supervision of the Manufacturer/ designer at site.</div><div>f) The performance test of the system shall be carried out by releasing the agent gas in a selected area and design parameters shall be measured. All equipment, refilling of gas after test, instruments etc. shall be provided by the contractor for the same.</div></div>												
	<div><div>SAFETY</div><div><div>(a) All the safety requirements recommended in NFPA -2001 or as specified by listing authorities shall be incorporated in the installation by the bidder.</div><div>(b) Appropriate warning signs shall be fixed outside of those areas protected by the system and also in areas where the gas may spread indicating clearly the hazard associated with the system such as Noise, turbulence, cold temperature, physiological effects on personnel etc.</div><div>(c) Apart from written warning signs, audio-visual type warning signs (i.e.) hooters & strobe lights shall be provided for pre-discharge and post-discharge activity. The sounder shall have selectable tone options.</div><div>(d) The gas shall be discharged after a set time delay on receiving signal from the fire detection system. The duration of the timer shall be up to a range of 0- 5 minutes (adjustable in 1 minute variation) at site after conducting tests to find out the duration for evacuation of the personnel from the area.</div><div>(e) To prevent the loss/release of gas automatically or manually during maintenance, the system shall have the facility of “LOCKOUT”. The status of the system lockout condition shall be annunciated audio-visually in the panel.</div></div></div>												
	<div><div>Pressure Venting</div><div>Since huge quantity of gas is envisaged to be released, proper pressure relief and ventilation systems such as fans, dampers, etc. shall be provided by the contractor. Required openings in the civil structure shall be provided. The contractor shall submit pressure relief, venting calculations, its requirements and suggestive mode of ventilation during detailed engineering for approval.</div></div>												
	<div><div>AIR CONDITIONING AND VENTILATION SYSTEM</div></div>												
	<div><div>DESIGN PHILOSOPHY - Air conditioning system</div></div>												
	<div><div>1. Design ambient conditions for all air conditioning system shall be as indicated below:</div></div>												
	<table><tr><th>Season</th><th>Dry Bulb Temp. (Deg. C)</th><th>Wet Bulb Temp. (Deg. C)</th></tr><tr><td>Dry</td><td>38</td><td>33.8</td></tr><tr><td>Rainy</td><td>32</td><td>30.6</td></tr></table>	Season	Dry Bulb Temp. (Deg. C)	Wet Bulb Temp. (Deg. C)	Dry	38	33.8	Rainy	32	30.6			
	Season	Dry Bulb Temp. (Deg. C)	Wet Bulb Temp. (Deg. C)										
	Dry	38	33.8										
	Rainy	32	30.6										
<div><div>2. All equipment of Air Conditioning system shall be designed for continuous duty.</div></div>													
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	<p>3. All air-conditioned areas like control room, control equipment rooms, office room, meeting/conference room, shift in-charge room, etc. shall be maintained at 24 deg. C \pm (plus or minus) 1 deg. C and relative humidity of 50% \pm (plus or minus) 5%.</p> <p>4. The fresh air quantity for air-conditioned areas of Control Room / Control Equipment Room / UPS, etc. shall be 0.45 M³/minutes/person or 1.0 air change per hour whichever is greater. However, for other areas quantity of fresh air shall be minimum 1.5 air changes per hour.</p> <p>5. Lighting load shall be minimum 1 Watts/Sq.feet or actual whichever is higher.</p> <p>6. The occupancy for general area shall be minimum one person per 10 Sq. M and for conference room the same shall be one per 3 Sq.M. In the control rooms, control, equipment rooms, VFD room, etc., the occupancy may be one person per 25 Sq.M (Minimum).</p> <p>7. In Air conditioning system the return air shall be through ducts and use of plenum space for return air shall be avoided. However, in areas/buildings where various floors are air-conditioned and no intermediate or intervening floor are left non-airconditioned, the space above false ceiling may be used as return air plenum.</p> <p>8. The supply and return air ducts shall be provided with automatic (motorized) fire dampers (of 90 minutes fire rating) at locations where ducts pass through walls (with perfect partition i.e. partition both above & below false ceiling) & floors. Operation of these dampers shall be interlocked with the fire alarm system and shall also be possible to operate manually from the remote-control panel. Required electrical contacts shall be provided in control panel of A/C by the Contractor for further wiring up to fire alarm panels.</p> <p>9. Air distribution system shall be sized to have a constant frictional drop along its length and velocity through ducts shall not exceed 7.6 m/sec.</p> <p>10. Coil face area of Air Handling units shall be designed considering a face velocity of not more than 2.5 m/sec.</p> <p>11. For Air Handling Units (AHUs), Packaged Air Conditioners (PACs), dehumidified air shall be filtered at two different stages i.e. pre (coarse) filter followed by fine filter before discharging it to conditioned space.</p> <p>12. A minimum design margin of ten (10) % shall be considered in design of AC Plant Capacity for each area. For areas where A/C load is of the order of 25-60 TR, Direct Expansion (D-X) type air-cooled condensing units along with AHUs shall be provided depending on the availability of space/ layout etc. For areas where A/C load is of the order of 5-25TR, ductable split/package A/C shall be provided. Smaller areas, which are away from the D-X type-condensing unit /central chilling units, which may require air conditioning up to 5 TR rating, shall be served with non-ductable split (Hi-wall/ Cassette) air conditioner units as per requirement.</p> <p>12.1 Refrigerant: Refrigerant should be CFC/HCFC free.</p> <p>12.2 Insulation for supply and return air ducts: Supply and return ducts shall be insulated.</p> <p>12.3 All types of Insulation used for HVAC applications shall be CFC/HCFC free.</p>			
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10.02.00	<div>13. During normal operation period, all the working equipment shall run on A.C. power supply. However, in case of complete black-out conditions, DG sets being provided are required to cater the load of some of the air-conditioning equipment. Minimum 50% load of working A/C equipment (Indoor and outdoor units, fresh air fans, etc.) Main Plant A/C System shall run on DG set.</div> <div>14. Minimum Star Rating/Co-efficient of performance (COP) of the Air-cooled condensing units (D-X) shall be as per latest ECSBC/BEE regulations/guidelines.</div>																	
	<div>DESIGN PHILOSOPHY OF VENTILATION SYSTEM</div> <div>1. Air changes per hour in mechanically ventilated areas shall be as follows:</div> <div><div>i) Main Machine (Engine) Hall</div><div>- 30</div></div> <div><div>ii) GIS Hall & other general areas</div><div>- 20</div></div> <div><div>iii) MCC/Cable Vaults/Switchgear rooms and Battery</div><div>- 30</div></div> <div>Rooms & other areas where gaseous fumes/ vapors are generated</div> <div>2. However, in areas producing lot of heat, temperature shall be the criteria as follows:</div> <div><div>a) Inside Temperature shall be maximum 6deg.C above the design ambient temperature during summer for mechanically ventilated Engine Hall.</div><div>b) Inside Temperature shall be maximum 3deg.C above the design ambient temperature during summer for mechanically ventilated other areas.</div></div> <div><div>Note:</div><div>Dry bulb temperature during summer season mentioned at Sl. No. 1 of 10.01.00 (Design Philosophy-Air Conditioning System) shall be considered as Design Ambient Temperature for above. The criteria which give higher number of air changes/higher quantity of air of either of condition (Cl. 1 or 2) flow shall be selected.</div></div> <div>2. All ventilation systems shall operate on 100% fresh air. Fan envisaged for MCC, Switchgear rooms shall be provided with pre-filters and fine filters and for other areas shall be provided with pre-filters only.</div> <div>3. All mechanically ventilated areas shall be positively ventilated. For positively ventilated areas, the exhaust air quantity shall be approximately 60% of total discharge of supply air fans. However, Battery rooms and other fumes/odour generating areas shall be negatively ventilated. Type of ventilation for various buildings shall be as follows:</div> <table><tr><th>S. No.</th><th>Area</th><th>Type of Ventilation system</th></tr><tr><td>(i)</td><td>General areas like pump houses, compressor house, etc.</td><td>Combination of Supply air fan & Exhaust air fans/Roof Extractor Fans</td></tr><tr><td>(ii)</td><td>MCCs and Switchgear room, Cable Vault, GIH Hall, etc.</td><td>Supply air fans & Back draft dampers</td></tr><tr><td>(iii)</td><td>Battery rooms & other fumes/odor generating areas</td><td>Combination of Air Intake Louvers & Exhaust air fans</td></tr><tr><td>(iv)</td><td>Toilet/pantry etc.</td><td>Exhaust air fans</td></tr></table>				S. No.	Area	Type of Ventilation system	(i)	General areas like pump houses, compressor house, etc.	Combination of Supply air fan & Exhaust air fans/Roof Extractor Fans	(ii)	MCCs and Switchgear room, Cable Vault, GIH Hall, etc.	Supply air fans & Back draft dampers	(iii)	Battery rooms & other fumes/odor generating areas	Combination of Air Intake Louvers & Exhaust air fans	(iv)	Toilet/pantry etc.
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11.00.00	4.	All the equipment of Ventilation system shall be designed for continuous duty.																												
	5.	Supply air fans, exhaust air fans & ventilations of each area shall be provided with local starter panels.																												
	6.	For fans, compressors, and blowers (as applicable), the continuous motor rating (at 50oC ambient) shall be at least 10% above the maximum load demand at the design duty point. However, for V-belt driven fans, continuous motor rating (at 50 deg.C ambient) shall be at least 15% above the maximum load demand at the design duty point.																												
	COMPRESSED AIR SYSTEM																													
11.01.00	DESIGN CRITERIA / BASIS AND PERFORMANCE GUARANTEE																													
	1.	All the equipment shall be designed for continuous duty and as well as for intermittent operation. Frequent start/stop of the system shall not result in deterioration in performance nor damage to the equipment.																												
	2.	The compressors and Air-Drying plants shall operate under the following ambient conditions.																												
	i.	Minimum temperature	:	15 deg. C																										
	ii.	Maximum temperature	:	40 deg. C																										
	iii.	Design condition (temperature & Relative humidity)	:	40 deg. C & 85% RH																										
	iv.	Height above MSL (m)	:	Refer Chapter “Project Information”																										
	3.	The design ambient conditions for the motors shall be as mentioned in relevant Electrical sub-sections.																												
	Selection of Capacity of Air Compressor																													
	11.01.01	Air Compressor for Instrument & Service Air Application:																												
	i)	Air Compressor shall be designed to meet the Instrument air and service air requirement of all the equipment/plant/systems to be supplied by the Contractor for GNI project as follows:																												
		<table><tr><th>Sl. No.</th><th>Continuous Requirement</th><th colspan="2">Quantity (in NM³/min)</th></tr><tr><td>1.</td><td>For all Gensets & it's auxiliaries</td><td colspan="2">A</td></tr><tr><td>2.</td><td>For Water Treatment Plant</td><td colspan="2">B</td></tr><tr><td>3.</td><td>For C&I System</td><td colspan="2">C</td></tr><tr><td>4.</td><td>Service air requirement for entire plant</td><td colspan="2">D [with D= 2.5 Nm3/min (minimum) or as per system requirement]</td></tr><tr><td>5.</td><td>Total air requirement</td><td>=</td><td>A+B+C+D</td></tr><tr><td>6.</td><td>Capacity of Air compressor</td><td>=</td><td>1.3 X (A+B+C+D)</td></tr></table>	Sl. No.	Continuous Requirement	Quantity (in NM ³ /min)		1.	For all Gensets & it's auxiliaries	A		2.	For Water Treatment Plant	B		3.	For C&I System	C		4.	Service air requirement for entire plant	D [with D= 2.5 Nm3/min (minimum) or as per system requirement]		5.	Total air requirement	=	A+B+C+D	6.	Capacity of Air compressor	=	1.3 X (A+B+C+D)
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	Notes:																													
	1.	While calculating the air requirement of Bidder's equipment/plant/systems, for continuous requirements of instrument air & service air, no diversity factor shall be																												
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12.00.00	<p>considered, and they are to be assumed to be of "Simultaneous Requirements". The intermittent requirement of instrument air & service air, if any, shall be converted into continuous requirement by considering frequency of such requirements or selecting an appropriate diversity factor and such diversity factor shall not be less than 0.4.</p> <ol style="list-style-type: none"> 2. The capacity of air-drying plant shall be equal to the capacity of the individual air compressors. The Air-drying plant, at its rated capacity, shall be designed to deliver continuously air at dew point of minus (-) 40 deg.C at atmospheric pressure and the Quality of dry outlet air to conform to Instrument Society of American Standard S7.3 "Quality Standard for Instrument Air". 3. Discharge pressure available at the outlet of Air-drying Plant shall be minimum 7.0 Kg/cm² (g) or more as per the requirement of Contractor. 4. The discharge pressure of compressor shall be minimum 8 Kg/cm²(g). 5. The heat exchangers shall be air cooled. 6. Noise level shall not exceed 85 dBA to a reference level of 0.0002 microbar when measured at a distance of 1.5 meters above the floor and 1m horizontal distance. Required acoustic enclosures may be provided to meet the above conditions. The discharge blow-off silencer and intake silencers shall be designed to meet the above noise limitation level. For eventual noise, from the discharge line, accessories and/or ancillary equipment which are not included, a correction factor of (+)8 dBA maximum shall be allowed for background & ambient noise. <p>Similarly, vibration level of screw compressor shall be as per VDI-3836. However, velocity vibration shall be limited to 10mm/sec (rms). Vibration level of centrifugal compressor shall be as per manufacturer standard & proven practice.</p> <ol style="list-style-type: none"> 7. Parallel operation of compressors shall be possible without any undue vibration and noise. 8. The flow in compressed air piping shall be designed for the design capacity of each compressor and the flow in header and ring mains to be designed for the total capacity of working compressors. 9. The EOT crane in machine hall shall be used for the operation or maintenance of air compressors. In case the air compressors are not in approach of the EOT crane, separate monorail beam with electric hoist shall be provided for handling air compressors. Further, if Air Compressors, Air Drying Plants, etc. are not possible to be placed within machine Hall, then separate compressor house (monorail beam with electric hoist) shall be provided by Contractor. 10. All hot vessels/pipelines/ valves shall be insulated to restrict the outside temperature within 60 deg. C or less with mineral wool (or equivalent), GI wire netting and aluminum cladding/cover. 			
	<p>CONTROL & INSTRUMENTATION</p> <p>Detailed requirements on C&I design philosophy to be followed for the project, same shall be as per Part-B, Section-VI of the Technical Specifications.</p>			
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13.00.00	ELECTRICAL Detailed requirements on electrical design philosophy to be followed for the project, same shall be as per Part-B, Section-VI of the Technical Specifications.																											
14.00.00	DESIGN CRITERIA FOR BALANCE OF PLANT (BOP) SYSTEMS Detailed requirements on BOP systems design philosophy to be followed for the project, same shall be as per Part-B, Section-VI of the Technical Specifications.																											
15.00.00	PROVENNESS OF EQUIPMENTS/SYSTEMS The bidder/its sub-vendor(s) is required to meet the provenness criteria and/or qualification requirement for the items/ services listed below as per the stipulated criteria indicated in the respective clauses..																											
15.01.00	The offered Gas engine should have logged a minimum of 4000 fired hours since commissioning and should have been in successful operation for a period of at least one (01) year prior to the date of techno-commercial bid opening. The Bidder shall furnish experience list of Gas engine offered to substantiate their provenness along with the techno commercial bid.																											
15.02.00	Main plant auxiliaries and balance of plant equipment/ systems: The bidder/ his sub-vendor(s) is required to meet the provenness criteria for equipment(s) / system(s) and bought out items as per the criteria stipulated below.																											
15.02.01	The following equipments offered by the Bidder shall be only from such manufacturer(s) who has previously designed (either by itself or under collaboration/Licensing agreement), manufactured/got manufactured the respective equipment(s) of the type and the minimum equipment rating as stipulated below such that the respective equipment should have been in successful operation for a period of at least one (1) year as on the LOA (Letter of Award) date of Great Nicobar Island Gas Power project package.																											
	<table><tr><th>S. No.</th><th>Name of Equipment/system</th><th>Type/Detail of Equipment/system</th><th>Equipment Rating</th></tr><tr><td colspan="4">Gas Engine Auxiliaries and Support Systems</td></tr><tr><td>1.</td><td>Starting air system</td><td>Starting air compressor and air receivers</td><td>As required for the offered RLNG fired fuel Engine.</td></tr><tr><td>2.</td><td>Engine lub oil system</td><td>Engine main lube oil pump, pre-lub oil pump & lub oil filter</td><td>As required for the offered RLNG fired fuel Engine.</td></tr><tr><td>3.</td><td>Engine Cooling System</td><td>Engine cooling pumps & radiator cooling package</td><td>As required for the offered RLNG fired fuel Engine.</td></tr><tr><td>4.</td><td>Exhaust gas system</td><td>Gas silencer, Expansion bellows & rupture disc on exhaust ducting</td><td>As required for the offered RLNG fired fuel Engine.</td></tr></table>	S. No.	Name of Equipment/system	Type/Detail of Equipment/system	Equipment Rating	Gas Engine Auxiliaries and Support Systems				1.	Starting air system	Starting air compressor and air receivers	As required for the offered RLNG fired fuel Engine.	2.	Engine lub oil system	Engine main lube oil pump, pre-lub oil pump & lub oil filter	As required for the offered RLNG fired fuel Engine.	3.	Engine Cooling System	Engine cooling pumps & radiator cooling package	As required for the offered RLNG fired fuel Engine.	4.	Exhaust gas system	Gas silencer, Expansion bellows & rupture disc on exhaust ducting	As required for the offered RLNG fired fuel Engine.			
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15.03.00	<p>Fire Detection and Protection System:</p> <p>The bidder/its sub-vendor should have designed, supplied, erected and commissioned at least one (1) Fire protection System of contract value not less than INR 35.0 million or equivalent in foreign currency (exchange rate applicable as on date of Techno-commercial bid opening), in industrial installation. The fire protection system should have comprised of:</p> <ul style="list-style-type: none"> a) Fire hydrant system. b) High velocity water (HVW) spray or medium velocity water (MVW) spray or sprinkler system. c) Fire water pumping and pressurizing arrangement. <p>The system mentioned above should have been designed to the recommendations of Tariff Advisory Committee of India or Oil Industry Safety Directorate (OISD) or any other International reputed authority (like LPC-U.K. or NFPA, USA) and this system should have been in successful operation for a period of not less than one (1) year.</p> <p>In addition, the analogue addressable type fire alarm system proposed to be supplied shall be sourced from a firm who has supplied at least one (1) similar system which has been approved or listed by UL-USA/ FM-USA / LPC-UK/ similar agency and should have been in operation for at least one (1) year.</p> <p>Further, the inert gas fire extinguishing system shall be sourced from agency who has designed and supplied at least one (1) inert gas total flooding fire extinguishing system each having a total risk volume of at least 500 cum. This system must have been designed to the recommendation of Tariff advisory committee of India or any other international reputed authority (like LPC-UK or NFPA, USA) and should have been in operating condition for a period not less than one (1) year.</p>			
15.04.00	<p>Compressed Air System:</p> <p>The bidder/its sub-vendor should have designed, manufactured, supplied, erected/supervised erection and commissioned/supervised commissioning at least one (1) number non-lubricated oil free screw type air compressor of minimum capacity 10 NM³/min at rated discharge pressure of 8 kg/cm² (g) which should have been in successful operation for at least one (1) year.</p> <p>The Air-Drying Plant (A.D.P) shall be supplied from such manufacturers who have manufactured and supplied at least one (1) number Air Drying Plant of capacity 10 Nm³/min or more and the type same as offered, which should have been in successful operation for at least one (1) year.</p>			
15.05.00	<p>PROVENNESS CRITERIA FOR ELECTRICAL EQUIPMENTS</p>			
15.05.01	<p>Generator</p> <p>The offered synchronous generator (alternator) shall be of proven design from such a manufacturer who would have manufactured and supplied synchronous generator of offered MW rating or 7 MW and above, whichever is lower, which should have been in successful operation in at least one (1) plant for a period not less than one (1) year as on date of award of the package.</p>			
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15.05.02	<p>BATTERY CHARGER</p> <p>Bidder/ Sub Vendor should have manufactured and supplied at least one number (1) of static automatic voltage regulator type Battery Chargers of highest offered rating or above, in at least one (1) industrial installation, which should have been in successful operation for at least one (1) year.</p>			
15.05.03	<p>TIE TRANSFORMERS</p> <p>a) Bidder/Sub-vendor should have designed, manufactured and supplied at least two (2) numbers (one each at two different installations) of 132 kV or above class transformers of at least 110MVA capacity which should have been in successful operation for at least two years.</p> <p style="text-align: center;">And</p> <p>b) Bidder/Sub-vendor should have its own facilities for conducting all routine and type tests as per IS: 2026 (except short circuit test).</p> <p style="text-align: center;">And</p> <p>c) 90 MVA, 132 KV or higher rated oil filled transformer manufactured by Bidder/Sub-vendor should have been successfully short circuit tested.</p> <p>Note (applicable for Cl. No. 15.05.03 & 15.05.09)</p> <p>(i) Two different installations means two different project sites or two different contracts.</p> <p>(ii) Equipment designed by the Bidder/Sub-vendor by itself or through its collaborator/associate/technology provider/licensor for reference plant, shall also be considered meeting the requirement of design.</p>			
15.05.04	<p>LT SWITCHGEAR:</p> <p>ROUTE 1</p> <p>1.1 Bidder/ Sub Vendor should have manufactured and supplied at least a total of two hundred & twenty five (225) numbers of draw out type Air Circuit Breaker Panels and / or draw out type Motor Control Centre Panels with fault rating of at least 45kA for one (1) second and 105kA peak under a single order and these panels should have been in successful operation for at least two (2) years.</p> <p style="text-align: center;">And</p> <p>1.2 Bidder/ Sub Vendor should have manufactured and supplied at least seventy five(75) numbers of Air Circuit Breakers having fault rating of at least 45kA rms BREAKING, 105kA peak MAKING and 45kA withstand for one (1) second, and their associated draw out type Air circuit breaker panels having fault rating of at least 45kA for one (1) second and 105kA peak, which should have been in successful operation for at least two (2) years.</p> <p>ROUTE 2</p> <p>1.3 Bidder/ Sub Vendor should have manufactured and supplied at least a total of two hundred & twenty five (225) numbers of draw out type Air Circuit Breaker Panels and / or draw out type Motor Control Centre Panels with fault rating of at least 45kA for one (1) second and 105kA peak under a single order and these panels should have been in successful operation for at least two (2) years.</p> <p style="text-align: center;">And</p> <p>1.4 Bidder/ Sub Vendor should have manufactured and supplied at least seventy five (75) numbers of draw out type Air Circuit Breaker panels having fault rating of at least 45kA for one (1) second and 105kA peak, which should have been in successful operation for at least two (2) years.</p> <p style="text-align: center;">And</p> <p>1.5 Bidder/Sub Vendor shall be considered qualified provided its Associate or Collaborator or Technology Provider or Licensor meets the requirement stipulated in Route-1 for sourcing of Air Circuit Breakers. The Associate or Collaborator or Technology Provider or Licensor shall provide a</p>			
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	<p>letter of technical support for successful performance of the Air Circuit Breakers, as per the format, given in the bidding document. This letter of technical support should be submitted at the time of placement of order on the Sub Vendor.</p> <p style="text-align: center;">And</p> <p>1.6 Bidder/ Sub Vendor should have established manufacturing facility for draw out type Air Circuit Breaker Panels and draw out type Motor Control Centre Panels in India. Further, all the panels for this project shall be manufactured and supplied from the Indian manufacturing facility.</p> <p>NOTE:</p> <ol style="list-style-type: none"> Each Single Front Panel shall be counted as one (1) Panel, Double Front Panel as one (1) Panel and Air Circuit Breaker Panel as one (1) Panel. The provenness criteria shall be applicable for all draw out type and fixed type switchboards except Lighting DBs and Welding DBs. <p>15.05.05 33KV GIS SWITCHGEARS:</p> <p>1.1 Bidder/ Sub Vendor should have manufactured and supplied at least Thirty (30) numbers offered 33KV Gas insulated Switchgear panels along with other components like Vacuum circuit breaker & disconnecter of fault rating of at least 40kA for one (1) second and 100kA peak, which should have been in successful operation for at least two (2) years."</p> <p>15.05.06 DC BATTERIES:</p> <p>Bidder/ Sub Vendor should have manufactured and supplied at least one (1) number of highest offered rating or above of high discharge type plante positive plante type battery (in case bidder offers Lead Acid plante type battery) in at least one (1) industrial installation, which should have been in successful operation for at least one(1) year.</p> <p>15.05.07 (A) HT POWER CABLES (3.3kV or above but below 33kV):</p> <p>The bidder / Sub-vendor should have manufactured and supplied following cables:</p> <ol style="list-style-type: none"> Atleast 50kms of XLPE insulated power cables of 6.35/11 KV or higher voltage grade, executed in one or more limited to maximum of three orders. At least one (1) Km of flame-retardant low smoke cables of any voltage level. <p>15.05.07 (B) HT POWER CABLES (33kV)</p> <p>The Bidder/ Sub Vendor should have manufactured and supplied following cables:</p> <ol style="list-style-type: none"> At least 20kms of XLPE insulated power cables of 19/33 kV or higher voltage grade, executed in one or more limited to maximum of three orders. <p style="text-align: center;">And</p> <ol style="list-style-type: none"> At least one (1) km of flame-retardant low smoke cables of any voltage level. <p>15.05.08 DG SETS:</p> <p>The bidder/Sub-vendor should have supplied at least one (1) number of DG set of rating not less than 1500 Kva, in at least one (1) installation, which should be in successful operation for at least one (1) year. The offered make of the DG set (Alternator and Engine) shall be same as that of reference plant DG sets.</p> <p>15.05.09 GENERATOR TRANSFORMERS AND AUXILIARY OIL FILLED TRANSFORMERS</p> <p>15.05.09.01 The Bidder/Sub-Vendor should have manufactured & supplied at least two (2) numbers (one each at two different installations) of 16 MVA, 33 KV or higher rating oil filled transformers which should have been in successful operation for a period of at least two (2) years.</p> <p style="text-align: center;">And</p>			
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15.05.09.02	Bidder/Sub-Vendor should have his own facilities for conducting all routine and type tests as per IS: 2026 (except short circuit test).			
	And			
15.05.09.03	16 MVA, 33 KV or higher rated oil filled transformer manufactured by Bidder/Sub-Vendor should have been successfully short circuit tested.			
15.05.10	<p>132 kV EHV POWER CABLE & CABLE ACCESSORIES:</p> <p>a) The bidder/Sub-vendor should have manufactured and supplied following cables: At least 1kms of XLPE insulated power cables of 132kV or higher voltage grade, executed in one or more orders and which must have been in successful operation for a minimum period of two (2) years.</p> <p>b) Sub-Qualifying Requirements for 132 kV Cable Accessories The Bidder/Sub-vendor should have manufactured and supplied minimum fifteen (15) nos. of cable Accessories of 132kV grade cables or above, and which must have been in successful operation for a minimum period of two (2) Years.</p>			
15.05.11	<p>PROVENESS REQUIREMENTS IN RESPECT OF SUPPLY ITEMS</p> <p>The bidder/its sub-vendor(s) is required to meet the proveness criteria and/or qualification requirement for the items/ services listed below as per the stipulated criteria indicated in the respective clauses. For the purpose of qualification of Bidders / Sub-vendor(s), experience shall be reckoned as on the LOA (Letter of Award) date of this package unless otherwise specified in the respective clauses. The Bidder/its Sub vendor(s) shall be a company incorporated in India under the Companies Act of India for Collaborator(s) / Associate / Licensor / Technology provider route as specified in various clauses of the proveness requirement for equipment/systems.</p> <p>All the major equipments to be supplied for the project shall meet the following requirements:</p> <p>I. 132KV GIS EQUIPMENTS</p> <p>The Bidder/Sub vendor should have designed, manufactured, Supplied, erected/ supervised erection, tested/ supervised testing and commissioned/ supervised commissioning of one (1) Gas Insulated Switchgear (GIS) equipment(s) installation having at least two (2) bays of 132kV or above voltage class with short circuit current of not less than 40 kA for 1 second, which should have been in successful operation been in successful operation for a period of minimum 3 months.</p> <p>Note: For the purpose of qualifying requirement</p> <ol style="list-style-type: none"> One no. of bay shall be considered as comprising of at least one Circuit Breaker (3 Phase), two disconnectors (3 Phase) and current transformers (3 Phase). Bays executed in extension substation/switchyard shall also be considered. 			
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	<p>II. 132 kV INSTRUMENT TRANSFORMERS (Current Transformers / Voltage Transformers as Applicable)</p> <p>132 kV Instrument Transformers being offered should be from Manufacturer who has manufactured and supplied atleast fifteen (15) nos. of single phase Instrument Transformers suitable for Air Insulated Substation/ Switchyard of 132 kV or above class which should have been in successful operation for minimum two (2) years.</p> <p>III. 132 kV DISCONNECTORS</p> <p>132kV Disconnectors being offered should be from Manufacturer who have manufactured and supplied atleast five (5) nos. of three phase Disconnectors suitable for Air Insulated Substation/Switchyard of 132kV or above class which should have been in successful operation for minimum two (2) years.</p> <p>IV. 132 kV SURGE ARRESTORS</p> <p>132kV Surge Arrestors being offered should be from Manufacturer who has manufactured and supplied atleast fifteen (15) nos. of single phase Surge Arrestors suitable for Air Insulated Substation/ Switchyard of 132kV or above class which should have been in successful operation for minimum two (2) years .</p>		
15.05.12	<p>SUBSTATION AUTOMATION SYSTEM & PROTECTIVE RELAYS:</p> <p>The Substation Automation System offered with distributed architecture should have been in successful operation in at least one (1) Substation/Switchyard of not less than 220 kV class for minimum one (1) year.</p> <p>The Generator Protection Relays, the Bay Protection Units including the Busbar protection and the energy metering System offered should be from manufacturer(s) who have manufactured and supplied the offered type of devices for respective equipment, which must have been in successful operation in a 100 MW or above unit / 220 kV class or above Substation/Switchyard for a minimum period of one (1) year.</p>		
15.06.00	SOLAR PV ROOFTOP ON PLANT BUILDINGS:		
15.06.01	<p>Solar PV rooftop EPC contractor:</p> <p>The Bidder or its Sub-vendor should have designed, supplied, erected/supervised erection and commissioned/supervised commissioning of SPV based grid connected power plant of at least one plant of 40 kWp or above. The reference plant of 40 kWp or above capacity must have been in successful operation for at least six months</p>		
15.06.02	<p>Solar PV Module:</p> <p>The bidder/sub-contractor shall meet the requirements as stipulated in para (a) and (b) below for supply of solar PV modules:</p> <p>a) The Bidder / sub-contractor should have manufactured and supplied the solar PV modules of cumulative installed capacity of 1MWp or above using any rating of modules and any source of indigenous or imported PV cells in any one financial year.</p> <p>b) The Bidder / sub-contractor should have manufactured and supplied solar PV modules built up</p>		
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	<p>using indigenous and/or imported PV cells of power rating 300Wp or above which must have been in successful operation for at least six months</p> <p>Note: The works referred at clause 15.06.02 (a) & 15.06.02 (b) can be in same or different projects.</p> <p>15.07.00 Balance equipment's/ systems:</p> <p>The Bidder at its option can source the balance of plant equipment/systems not covered in clause 15.01.00, 15.02.00, 15.03.00, 15.04.00, 15.05.00 & 15.06.00 above. However, for such balance of plant equipment/systems, the Owner reserves the rights to satisfy himself on the provenness of the equipment and capability and capacity of the manufacturers</p> <p>15.08.00 Notwithstanding anything stated above, the Employer reserves the right to assess the capabilities and capacity of the Bidder/its Collaborators/ licensor/ its sub-contractors to perform the contract, should the circumstances warrant such assessment in the overall interest of the Employer.</p> <p>15.09.00 To enable the approval of sub-vendors, the Bidder shall provide all necessary data such as type, design, make, capacity, duty conditions, date of commissioning/ operation etc.</p>		
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	<div>ANNEXURE – I (A)</div> <div>MINISTRY OF ENVIRONMENT AND FORESTS New Delhi, the 22nd December, 1998</div> <p>G.S.R.7.- In exercise of the powers conferred by sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986 namely:-</p> <p>82. Environmental Standards for <u>Gas Naphtha-based Thermal Power Plants.</u></p> <p>(i) Limit for emission of Nox</p> <p>(a) For existing units – 150 ppm (v/v) at 15% excess oxygen.</p> <p>(b) For new units with effect from 1-6-1999.</p> <table><tr><th>Total generation of gas turbine</th><th>Limit for Stack Nox emission [(v/v) at 15% excess oxygen]</th></tr><tr><td>(a) 400 MW and above</td><td>(i) 50ppm for the units burning natural gas. (ii) 100 ppm for the units burning naphtha</td></tr><tr><td>(b) Less than 400MW but upto 100 MW</td><td>(i) 75 ppm for the units burning natural gas (ii) 100 ppm for the units burning naphtha</td></tr><tr><td>(c) Less than 100 MW</td><td>100 ppm for units burning natural gas or naphtha as fuel</td></tr><tr><td>(d) For the plants burning gas in a conventional boiler.</td><td>100 ppm</td></tr></table> <p>(iii) Stack height H in m should be calculated using the formula $H = 14 Q^{0.3}$, where Q is the emission rate of SO₂ in kg/hr, subject to a minimum of 30 mtrs.</p> <p>(iv) Liquid waste discharge limit</p> <table><tr><th>Parameter</th><th>Maximum Limit of concentration (mg/l except for pH and temperature)</th></tr><tr><td>pH</td><td>6.5-8.5</td></tr><tr><td>Temperature</td><td>As applicable for other thermal power plants</td></tr><tr><td>Free available chlorine</td><td>0.5</td></tr><tr><td>Suspended solids</td><td>100.0</td></tr><tr><td>Oil and grease</td><td>20.0</td></tr><tr><td>Copper (total)</td><td>1.0</td></tr><tr><td>Iron (Total)</td><td>1.0</td></tr><tr><td>Zinc</td><td>1.0</td></tr><tr><td>Chromium (total)</td><td>0.2</td></tr><tr><td>Phosphate</td><td>5.0</td></tr></table>	Total generation of gas turbine	Limit for Stack Nox emission [(v/v) at 15% excess oxygen]	(a) 400 MW and above	(i) 50ppm for the units burning natural gas. (ii) 100 ppm for the units burning naphtha	(b) Less than 400MW but upto 100 MW	(i) 75 ppm for the units burning natural gas (ii) 100 ppm for the units burning naphtha	(c) Less than 100 MW	100 ppm for units burning natural gas or naphtha as fuel	(d) For the plants burning gas in a conventional boiler.	100 ppm	Parameter	Maximum Limit of concentration (mg/l except for pH and temperature)	pH	6.5-8.5	Temperature	As applicable for other thermal power plants	Free available chlorine	0.5	Suspended solids	100.0	Oil and grease	20.0	Copper (total)	1.0	Iron (Total)	1.0	Zinc	1.0	Chromium (total)	0.2	Phosphate	5.0	
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	<p>83. NOISE POLLUTION CONDITIONS: STANDARD EC CONDITIONS FOR THERMAL POWER SECTOR</p> <p>A.) As per Standard EC Condition for Thermal Power Sector, 19th Nov 2018</p> <ol style="list-style-type: none"> 1. The Ambient Noise levels shall meet the standards prescribed as per the Noise Pollution (Regulation and Control) Rules, 2000. 2. Persons exposed to high noise generating equipment shall use Personal Protective Equipment (PPE) like earplugs/ ear muffs, etc. 3. Periodical medical examination on hearing loss shall be carried out for all the workers and maintain audiometric record and for treatment of any hearing loss including rotating to non-noisy/less noisy areas. <p>PROJECT SPECIFIC CONDITION:</p> <p>B.) As per Env. (Protection) Third Amendment Rules, 2016, 7th March 2016</p> <p>Noise Limits:-</p> <ol style="list-style-type: none"> (a) Noise from gensets shall be controlled by providing an acoustic enclosure or by treating the room acoustically, at the users end. (b) The acoustic enclosure shall be designed for minimum 25 dB(A) insertion loss or for complying with the ambient noise standards, whichever is on the higher side (if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure or acoustic treatment. Under such circumstances, the performance may be checked for noise reduction upto actual ambient noise level, preferably, in the night time between 10.00 PM-6.00 AM). The measurement for insertion loss may be done at different points at 0.5 m from the acoustic enclosure or room, and then averaged. <p>84 Temperature Limit for Discharge of Condenser Cooling Water from Thermal Power Plant.</p> <p>A New thermal power plants commissioned after June1, 1999.</p> <p>New thermal power plants, which will be using water from rivers/lakes/reservoirs, shall install cooling towers irrespective of location and capacity. Thermal power plants which will use sea water for cooling purpose, the condition below will apply.</p> <p>B New projects in coastal areas using sea water.</p> <p>The thermal power plants using sea water should adopt suitable system to reduce water temperature at the final discharge point so that the resultant rise in the temperature of receiving water does not exceed 7°C over and over the ambient temperature of the receiving water bodies.</p> <p>C Guidelines for discharge point :</p> <ol style="list-style-type: none"> 1. The discharge point shall preferably be located at the bottom of the water body at mid-stream for proper dispersion of thermal discharge. 2. In case of discharge of cooling water into sea, proper marine outfall shall be designed to achieve the prescribed standards. The point of discharge may be selected in consultation with concerned State Authorities/NIO. 3. No cooling water discharge shall be permitted in estuaries or near ecologically sensitive areas such as mangroves, coral reefs/spawning and breeding grounds of aquatic flora and fauna. 			
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	<div>Annexure –II (A)</div> <div>GENERAL STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTANTS</div> <div>PART- A: EFFLUENTS</div> <div>(Published vide MOEF Notification dated 19.05.1993 under Env. (Protection) Rules, 1986 and amended vide Notification dated 31.12.1993)</div> <table><tr><th>Sl. No.</th><th>Parameter</th><th colspan="4">Standards</th></tr><tr><th></th><th></th><th>Inland surface water</th><th>Public sewers</th><th>Land for irrigation</th><th>Marine coastal areas</th></tr><tr><th></th><th>2</th><th></th><th>3</th><th></th><th></th></tr><tr><th></th><th></th><th>(a)</th><th>(b)</th><th>(c)</th><th>(d)</th></tr><tr><td>1.</td><td>Colour & odour</td><td>All efforts should be made to remove colour and unpleasant odour as far as practicable</td><td>-</td><td>All efforts should be made to remove colour and unpleasant odour as far as practicable</td><td>All efforts should be made to remove colour and unpleasant odour as far as practicable</td></tr><tr><td>2.</td><td>Suspended solids mg/l, Max.</td><td>100</td><td>600</td><td>200</td><td>(a) For process waste water-100 (b) For cooling water effluent 10 per cent above total suspended matter of influent.</td></tr><tr><td>3.</td><td>Particle size of suspended solids</td><td>shall pass 850 micron IS Sieve</td><td>-</td><td></td><td>(a) Floatable solids, max. 3mm. (b) Settleable solids max 850 micron.</td></tr><tr><td>4.</td><td>pH value</td><td>5.5 to 9.0</td><td>5.5 to 9.0</td><td>5.5 to 9.0</td><td>5.5 to 9.0</td></tr><tr><td>5.</td><td>Temperature</td><td>Shall not exceed 5°C above the receiving water temperature.</td><td>-</td><td>-</td><td>Shall not exceed 5°C above the receiving water temperature.</td></tr><tr><td>6.</td><td>Oil and grease mg/l Max.</td><td>10</td><td>20</td><td>10</td><td>20</td></tr><tr><td>7.</td><td>Total residual chlorine mg/l Max.</td><td>1.0</td><td>-</td><td>-</td><td>1.0</td></tr><tr><td>8.</td><td>Ammoniacal nitrogen (as N) mg/l max.</td><td>50</td><td>50</td><td>-</td><td>50</td></tr></table>					Sl. No.	Parameter	Standards						Inland surface water	Public sewers	Land for irrigation	Marine coastal areas		2		3					(a)	(b)	(c)	(d)	1.	Colour & odour	All efforts should be made to remove colour and unpleasant odour as far as practicable	-	All efforts should be made to remove colour and unpleasant odour as far as practicable	All efforts should be made to remove colour and unpleasant odour as far as practicable	2.	Suspended solids mg/l, Max.	100	600	200	(a) For process waste water-100 (b) For cooling water effluent 10 per cent above total suspended matter of influent.	3.	Particle size of suspended solids	shall pass 850 micron IS Sieve	-		(a) Floatable solids, max. 3mm. (b) Settleable solids max 850 micron.	4.	pH value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.	Temperature	Shall not exceed 5°C above the receiving water temperature.	-	-	Shall not exceed 5°C above the receiving water temperature.	6.	Oil and grease mg/l Max.	10	20	10	20	7.	Total residual chlorine mg/l Max.	1.0	-	-	1.0	8.	Ammoniacal nitrogen (as N) mg/l max.	50	50	-	50
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	Sl. No.	Parameter	Standards			
			Inland surface water	Public sewers	Land for irrigation	Marine coastal areas
	2			3		
			(a)	(b)	(c)	(d)
	9.	Total Kjeldahl nitrogen (as N); mg/l Max.	100	-	-	100
	10.	Free ammonia (as NH ₃) mg/l, Max.	5.0	-	-	5.0
	11.	Biochemical oxygen demand (5 days at 20°C), mg/l Max.	30	350	100	100
	12.	Chemical oxygen demand mg/l Max.	250	-	-	250
	13.	Arsenic (as As) mg/l Max.	0.2	0.2	0.2	0.2
	14.	Mercury (as Hg), mg/l Max.	0.01	0.01	-	0.01
	15.	Lead (as Pb) mg/l, Max	0.1	1.0	-	2.0
	16.	Cadmium (as Cd) mg/l, Max	2.0	1.0	-	2.0
	17.	Hexavalent chromium (as Cr+6) mg/l, Max	0.1	2.0	-	1.0
	18.	Total chromium (as Cr) mg/l, Max	2.0	2.0	-	2.0
	19.	Copper (as Cu) mg/l, Max	3.0	3.0	-	3.0
	20.	Zinc (as Zn) mg/l, Max	5.0	15	-	15
	21.	Selenium (as Se) mg/l, Max	0.05	0.05	-	0.05
	22.	Nickel (as Ni) mg/l, Max	3.0	9.0	-	5.0
	23.	Cyanide (as CN) mg/l, Max	0.2	2.0	0.2	0.2
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	Sl. No.	Parameter	Standards			
			Inland surface water	Public sewers	Land for irrigation	Marine coastal areas
	2			3		
			(a)	(b)	(c)	(d)
	24.	Fluoride (as F) mg/l, Max	2.0	15	-	15
	25.	Dissolved phosphates (as P) mg/l, Max	5.0	-	-	-
	26.	Sulphide (as S) mg/l, Max	2.0	-	-	5.0
	27.	Phenonic compounds (as C ₃ H ₃ OH) mg/l, Max	1.0	5.0	-	5.0
	28.	Radioactive materials:				
		a) Alpha emitters UC/ml max.	10 ⁻⁷ 10 ⁻⁷	10 ⁻⁷ 10 ⁻⁷	10 ⁻⁷ 10 ⁻⁷	10 ⁻⁷ 10 ⁻⁷
	29.	Bio-assay test	90% survival of fish after 96 hours in 100% effluent.	90% survival of fish after 96 hours in 100% effluent.	90% survival of fish after 96 hours in 100% effluent.	90% survival of fish after 96 hours in 100% effluent.
				90% survival of fish after 96 hours in 100% effluent.	90% survival of fish after 96 hours in 100% effluent.	90% survival of fish after 96 hours in 100% effluent.
	30.	Manganese (as Mn)	2 mg/l	2 mg/l		2 mg/l
	31.	Iron (as Fe)	3 mg/l	3 mg/l		3 mg/l
	32.	Vanadium (as V)	0.2 mg/l	0.2 mg/l		0.2 mg/l
	33.	Nitrate Nitrogen	10 mg/l	-	-	20 mg/l
Notes: 1. Regarding temperature limits for discharge of condenser cooling water from thermal power plants, MOEF vide Notification dated 22.12.1998 has stipulated that all new thermal power plants commissioned after June 1, 1999 which will be using water from river/ lake/ reservoir, shall install cooling towers irrespective of location and capacity.						
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	<div>ANNEXURE-II (B)</div> <div>LATEST MOEF&CC STANDARDS PUBLISHED VIDE GAZETTE NOTIFICATION DATED 13.10.2017</div> <div>MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE</div> <div>NOTIFICATION</div> <div>New Delhi, the 13th October, 2017</div> <div>G.S.R. 1265(E).—In exercise of the powers conferred by sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely:—</div> <div>1. Short title and commencement.—(1) These rules may be called the Environment (Protection) Amendment Rules, 2017.</div> <div>(2) They shall come into force on the date of their publication in the Official Gazette.</div> <div>2. In the Environment (Protection) Rules, 1986, in Schedule – I, after serial number 104 and the entries relating thereto, the following serial number and entries shall be inserted, namely:—</div> <table><tr><th>Sl. No.</th><th>Industry</th><th>Parameters</th><th>Standards</th></tr><tr><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td></td><td colspan="2">Effluent discharge standards (applicable to all mode of disposal)</td></tr><tr><td rowspan="6">105</td><td rowspan="6">Sewage Treatment Plants (STPs)</td><td></td><td>Location</td></tr><tr><td></td><td>(a)</td></tr><tr><td>pH</td><td>Anywhere in the country</td></tr><tr><td>Bio-Chemical Oxygen Demand (BOD)</td><td>Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir, and Union territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep</td></tr><tr><td></td><td>Concentration not to exceed</td></tr><tr><td></td><td>(b)</td></tr><tr><td></td><td></td><td></td><td>6.5-9.0</td></tr><tr><td></td><td></td><td></td><td>20</td></tr><tr><td></td><td></td><td></td><td>30</td></tr><tr><td></td><td></td><td>Total Suspended Solids (TSS)</td><td>Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir and Union territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep</td></tr><tr><td></td><td></td><td></td><td>Areas/regions other than mentioned above</td></tr><tr><td></td><td></td><td></td><td><50</td></tr><tr><td></td><td></td><td></td><td><100</td></tr><tr><td></td><td></td><td>Fecal Coliform (FC) (Most Probable Number per 100 milliliter, MPN/100ml)</td><td>Anywhere in the country</td></tr><tr><td></td><td></td><td></td><td><1000</td></tr></table> <div>*Metro Cities are Mumbai, Delhi, Kolkata, Chennai, Bengaluru, Hyderabad, Ahmedabad and Pune.</div> <div>Note :</div> <div>(i) All values in mg/l except for pH and Fecal Coliform.</div> <div>(ii) These standards shall be applicable for discharge into water bodies as well as for land disposal/applications.</div> <div>(iii) The standards for Fecal Coliform shall not apply in respect of use of treated effluent for industrial purposes.</div> <div>(iv) These Standards shall apply to all STPs to be commissioned on or after the 1st June, 2019 and the old/existing STPs shall achieve these standards within a period of five years from date of publication of this notification in the Official Gazette.</div> <div>(v) In case of discharge of treated effluent into sea, it shall be through proper marine outfall and the existing shore discharge shall be converted to marine outfalls, and in cases where the marine outfall provides a minimum initial dilution of 150 times at the point of discharge and a minimum dilution of 1500 times at a point 100 meters away from discharge point, then, the existing norms shall apply as specified in the general discharge standards.</div> <div>(vi) Reuse/Recycling of treated effluent shall be encouraged and in cases where part of the treated effluent is reused and recycled involving possibility of human contact, standards as specified above shall apply.</div> <div>(vii) Central Pollution Control Board/State Pollution Control Boards/Pollution Control Committees may issue more stringent norms taking account to local condition under section 5 of the Environment (Protection) Act, 1986*.</div>			Sl. No.	Industry	Parameters	Standards	1	2	3	4			Effluent discharge standards (applicable to all mode of disposal)		105	Sewage Treatment Plants (STPs)		Location		(a)	pH	Anywhere in the country	Bio-Chemical Oxygen Demand (BOD)	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir, and Union territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep		Concentration not to exceed		(b)				6.5-9.0				20				30			Total Suspended Solids (TSS)	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir and Union territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep				Areas/regions other than mentioned above				<50				<100			Fecal Coliform (FC) (Most Probable Number per 100 milliliter, MPN/100ml)	Anywhere in the country				<1000
Sl. No.	Industry	Parameters	Standards																																																														
1	2	3	4																																																														
		Effluent discharge standards (applicable to all mode of disposal)																																																															
105	Sewage Treatment Plants (STPs)		Location																																																														
			(a)																																																														
		pH	Anywhere in the country																																																														
		Bio-Chemical Oxygen Demand (BOD)	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir, and Union territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep																																																														
			Concentration not to exceed																																																														
			(b)																																																														
			6.5-9.0																																																														
			20																																																														
			30																																																														
		Total Suspended Solids (TSS)	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir and Union territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep																																																														
			Areas/regions other than mentioned above																																																														
			<50																																																														
			<100																																																														
		Fecal Coliform (FC) (Most Probable Number per 100 milliliter, MPN/100ml)	Anywhere in the country																																																														
			<1000																																																														
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC. NO: CS-6401-001-2	VOLUME- IV	PAGE 32 OF 32																																																														

**GREAT NICOBAR ISLAND GAS ENGINE POWER
PROJECT (108 MW ±5 MW) EPC PACKAGE
BIDDING DOCUMENT NO. CS-6401-001-2**

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Bidder's Name and Address:

To
NTPC Limited
Noida-201301, India

Summary of Critical Equipment indicated under clause 15.00.00, volume-IV, Part-A of Section-VI.

Equipment Name	Sub-Vendor Name	Collaborator's Name, if applicable	Seeking Qualification as per clause..... Sub-Section-I, Part-A of Section-VI
Gas Engine			15.01.00
Starting Air system			*15.02.01
Engine Lube Oil system			*15.02.01
Engine Cooling system			*15.02.01
Exhaust Gas system			*15.02.01
Fire Detection and Protection system			*15.03.00
Compressed Air system			*15.04.00
Electrical Equipments			*15.05.00
Solar PV Rooftop			*15.06.00/*15.06.01/*15.06.02

***Strike-off whichever is not applicable.**

Note :

1. If qualification sought as per clause 15.00.00, volume-IV, Part-A of Section-VI then the details of the sub vendor (manufacturer) shall be filled by the bidder in the format A to J.

1.00.00 PROVENNESS DATA FOR MECHANICAL EQUIPMENTS

- A. Gas Engine:** We declare that, we have supplied gas engine which is of proven design. The offered Gas engine have logged a minimum of 4000 fired hours since commissioning and have been in successful operation for a period of at least one(01) year prior to the date of techno-commercial bid opening, as per the details furnished below:

Sl. No.	Description	Reference Work
1.	Name of the reference plant & location:	
2.	Client name and his address:	
3.	No. of units and capacity in MW of unit:	
4.	Whether equipment operating in power plant	-*Yes/*No
5.	Name of equipment manufacturer & address:	
6.	Date of commission of the Engine	
7.	Model no. of the equipment:	
8.	Brief Technical particulars of the engine:	

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Sl. No.	Description	Reference Work
a.	Engine Speed - rpm
b.	Power Output (Electrical generated power) – i) On RLNG kWe kWe
c.	Frequency -	..... Hz
d.	No. of Cylinders	..... Nos.
e.	Bore size	..... mm
f.	Swept Volume per cylinder	..... dm ³
g.	No. of Stroke	..... nos.
h.	Stroke Length	..... mm
9.	Scope of Work: *Letter of Award or *Contract or *P.O.	enclosed at Annexure..... to Attachment-3K
10.	Performance details:	*Certificate/*Letter/*E-mail/*Performance Curve from End user enclosed at Annexure.... to Attachment-3K

* Strike off whichever is not applicable.

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B. DELETED

C. DELETED

D. Starting Air system: We declare that, we/our Sub-Vendor, have previously designed, (either by itself or under collaboration/Licensing agreement), *manufactured/*got manufactured the Starting Air System as required for the offered RLNG fired Engine and which has been in successful operation for a period of at least one (1) year on as on the LOA (Letter of Award) date of Great Nicobar Island Gas Engine Power project package, as per the details furnished below:

Sl. No.	Description	Reference Work
1.	Name of the reference plant & location:	
2.	Client name and his address:	
3.	Name of equipment manufacturer & address:	
4.	Date of commission of the equipments:	
5.	Model no. of the equipment:	
6.	Brief Technical particulars of the equipments:	
7.	Capacity-

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Sl. No.	Description	Reference Work
8.	Whether the equipment(s) are in successful operation in at least one (01) plant for a period not less than one (01) year as on the LOA date of contract to the Main bidder	-*Yes/*No
9.	Starting & Air system details:	*Technical extract/ *paper letter/ *email/ *Drawing from user or *contract document or *scheme or *any document in public domain enclosed at annexure. to Attachment-3K
10.	Scope of Work:	*Letter of Award or *Contract or *P.O. enclosed at Annexure. to Attachment-3K
11.	Performance details:	*Certificate/*Letter/*E-mail from End user enclosed at Annexure. to Attachment-3K

* Strike off whichever is not applicable.

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- E. Engine Lube Oil system:** We declare that, we/our Sub-Vendor, have previously designed, (either by itself or under collaboration/Licensing agreement), *manufactured/*got manufactured the Engine Lube Oil System as required for the offered RLNG fired Engine and which has been in successful operation for a period of at least one (1) year on as on the LOA (Letter of Award) date of Great Nicobar Island Gas Engine Power project package, as per the details furnished below:

Sl. No.	Description	Reference Work
1.	Name of the reference plant & location:	
2.	Client name and his address:	
3.	No. of units and capacity in MW of unit:	
4.	Whether operating in a similar process/duty application	-*Yes/*No....(indicate industry type)
5.	Name of equipment manufacturer & address:	
6.	Date of commission of the equipments:	
7.	Model no. of the equipment:	
8.	Brief Technical particulars of the equipments:	
a.	Head-	..... meters of liquid column
b.	Flow	.....
9.	Whether the equipment(s) are in successful operation for in least one(01) plant for a period not less than one(01) year as on the LOA date of contract to the Main bidder	-*Yes/*No

- | | | |
|-----|---------------------------------|--|
| 10. | Engine Lube Oil system details: | *Technical extract/ *paper letter/ *email/
*Drawaing from user or *contract docu ment
or *scheme or *any document in public
domain enclosed at annexure. to
Attachment-3K |
| 11. | Scope of Work: | *Letter of Award or *Contract or *P.O.
enclosed at Annexure. to Attachment-3K |
| 12. | Performance details: | *Certificate/*Letter/*E-mail from End user
enclosed at Annexure. ... to Attachment-3K |
-

* Strike off whichever is not applicable.

**GREAT NICOBAR ISLAND GAS ENGINE POWER
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- F. Engine Cooling system:** We declare that, we/our Sub-Vendor, have previously designed, (either by itself or under collaboration/Licensing agreement), *manufactured/*got manufactured the Engine Cooling System as required for the offered RLNG fired Engine and which has been in successful operation for a period of at least one (1) year on as on the LOA (Letter of Award) date of Great Nicobar Island Gas Engine Power project package, as per the details furnished below:

Sl. No.	Description	Reference Work
1.	Name of the reference plant & location:	
2.	Client name and his address:	
3.	No. of units and capacity in MW of unit:	
4.	Name of equipment manufacturer & address:	
5.	Date of commission of the equipments:	
6.	Model no. of the equipment:	
7.	Brief Technical particulars of the equipments:	
8.	Whether the equipment(s) are in successful operation in atleast one(01) plant for a period not less than one(01) year as on the LOA date of contract to the Main bidder	- *Yes/*No
9.	Engine cooling system details:	*Technical extract/ *paper letter/ *email/ *Drawing from user or *contract document or *scheme or *any document in public domain enclosed at annexure. to Attachment-3K
10.	Scope of Work:	*Letter of Award or *Contract or *P.O.

enclosed at Annexure. to Attachment-3K

11. Performance details:

*Certificate/*Letter/*E-mail from End user
enclosed at Annexure. ... to Attachment-3K

* Strike off whichever is not applicable.

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- G. Exhaust Gas system:** We declare that, we/our Sub-Vendor, have previously designed, (either by itself or under collaboration/Licensing agreement), *manufactured/*got manufactured the Exhaust Gas System as required for the offered RLNG fired Engine and which has been in successful operation for a period of at least one (1) year on as on the LOA (Letter of Award) date of Great Nicobar Island Gas Engine Power project package, as per the details furnished below::

Sl. No.	Description	Reference Work
1.	Name of the reference plant & location:	
2.	Client name and his address:	
3.	No. of units and capacity in MW of unit:	
4.	Name of equipment manufacturer & address:	
5.	Date of commission of the equipment:	
6.	Model no. of the equipment:	
7.	Whether the equipment(s) are in successful operation in at least one(01) plant for a period not less than one(01) year as on the LOA date of contract to the Main bidder	-*Yes/*No
8.	Exhaust gas system details:	*Technical extract/ *paper letter/ *email/ *Drwaing from user or *contract document or *scheme or *any document in public domain enclosed at annexure. to Attachment-3K
9.	Scope of Work:	*Letter of Award or *Contract or *P.O. enclosed at Annexure. to Attachment-3K

10. Performance details:

*Certificate/*Letter/*E-mail from End
user enclosed at Annexure. to
Attachment-3K

* Strike off whichever is not applicable.

H. DELETED

I. Sub-Qualifying Requirements for the Fire Detection and Protection System

To satisfy the requirements specified in Clause No. 15.03.00 of Volume-IV, Part-A, Section-VI of Bidding Document, we furnish following details:

1. We/ sub-vendor declare that we have designed, supplied, erected and commissioned at least One (1) fire protection system of Contract value not less than Rs.35.0 million or equivalent in foreign currency (exchange rate applicable as on date of Techno-commercial Bid Opening), in industrial installation. The Fire Protection System comprise of

- a) fire hydrant system
- b) high velocity water (HVW) spray or medium velocity water (MVW) spray or sprinkler system.
- c) fire water pumping and pressurizing arrangement.

We further declare that the systems mentioned above have been designed to the recommendations of *Tariff Advisory Committee of India or Oil Industry Safety Directorate (OISD) or any other International reputed authority (like LPC-U.K. or NFPA - USA) and these systems is in successful operation for a period of not less than one (1) year. The details of Fire Protection system executed by us are furnished below: -

Details pertaining to Technical Qualification of the Sub-vendor.

Sl.No.	Description	Plant No. 1
A.	DATA OF FIRE PROTECTION SYSTEMS EXECUTED: (To be filled up for contracts having order value not less than Rs. 35.00 million or equivalent in foreign currency (exchange rate applicable as on date of techno-commercial bid opening)	
1.	Client name and address	.....
2.	Name and Address of the plant/ installation	.....
3.	Whether Fire protection system executed is for industrial installation ?	Yes*/No*
4.	Date of order	.....
5.	Date of commissioning	.....

Sl.No.	Description	Plant No. 1
6.	Period of operation	.....
7.	Value of the order in Rs. Million	.....
8.	The Scope included :	
	a) Design	Yes*/No*
	b) Supply	Yes*/No*
	c) Erection	Yes*/No*
	d) Commissioning	Yes*/No*
9.	The fire protection system have been designed as per TAC/OISD/any other International reputed authority (like LPC-UK or NFPA, USA) (Please indicate the name of the authority)	Yes*/No*
10.	The above contract included :	
	a) Fire Hydrant system	Yes*/No*
	b) High velocity water spray (HVW) system	Yes*/No*
	c) Medium velocity water spray (MVW) System	Yes*/No*
	d) Sprinkler System	Yes*/No*
	e) Fire water pumping and pressurizing arrangement	Yes*/No*
11.	Documentary evidence/certificate from client in support of above is enclosed	Yes*/No*

Note : (1) Continuation sheets of like size and format may be used as per Sub-vendor requirement and be annexure to this attachment.

* **Please Strike off whichever is not applicable.**

2. We/ Sub-Vendor furnish the following details of the firm from whom the analogue addressable type fire alarm system is proposed to be supplied for this package.

We / sub-vendor further declare that the analogue addressable type fire alarm system proposed to be supplied shall be sourced from a firm M/S _____ who has supplied at least One (1) similar system and these system has been approved or listed by UL-USA / FM-USA / LPC-UK / similar agency and are in successful operation for at least One (1) year. The details of the proposed firm are furnished below:

Sl.No.	Description	Plant No. 1
1.	Name of supplier	.....
2.	Address of supplier	.....
3.	Experience details of supplier	
a)	Name of the client	.....
b)	Address of the client	.....
c)	Address of the installation	.....
d)	Type of the installation (Industrial / commercial)	.....
e)	Whether the installed system has been approved by UL- USA/FM-USA/LPC-UK/Similar agency ? (please specify agency)	Yes*/No*
f)	Whether the installed system has been listed by UL-USA/ FM-USA/LPC-UK / Similar agency? (please specify agency)	Yes*/No*
g)	Date of order / award for analogue addressable type fire alarm system	.....
h)	Date of commissioning of the above system
i)	Number of years for which the system is in operation

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Sl.No.	Description	Plant No. 1
j)	Documentary evidence/certificate in support of above system to be enclosed

*** Please strike off whichever is not applicable.**

Note : If a Sub-vendor proposed more than one firm for the supply of analogue addressable type fire alarm system, separate data shall be submitted in the above format for each of the proposed suppliers.

3. We / our sub-vendor furnish the following details of the firm from whom the inert gas fire extinguishing system is proposed to be supplied for this package.

We / our sub-vendor further declare that the Inert gas fire extinguishing system to be supplied under the package shall be sourced from an agency M/S _____ who has designed and supplied at least One (1) Inert gas total flooding fire extinguishing system having a total risk Volume of atleast 500 Cu.m. Further, we declare that this system have been designed to the recommendation of Tariff Advisory Committee of India or any other international reputed authority (like LPC-U.K. or NFPA, USA) and have been in operating condition for a period not less than One (1) year. The details of the proposed firm are furnished below :

Name of the Agency proposed for
this Package by the bidder :

Sl. No.	Description	Plant No. 1
1.	Name of supplier	.....
2.	Address of supplier	.....
3.	Experience details of supplier	
a)	Name of the client	.....
b)	Address of the client	.....
c)	Address of the installation	.....
d)	Type of the installation (Industrial / commercial), pl. specify	.....
e)	Whether the installed systems have been designed to the recommendation of TAC-India or any other international reputed authority (like LPC- UK or NFPA - USA) (please specify agency)	Yes*/No*

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Sl.No.	Description	Plant No. 1
f)	Risk area protected using the above system has a volume ofCu.M
g)	The total flooding gaseous fire extinguishing system has been designed by bidder.	Yes*/No*
h)	Date of order / award for total flooding inert gas fire extinguishing system	.....
i)	Date of commissioning of the above system	.....
j)	Number of years for which the system is in operation	.....
k)	Documentary evidence/certificate in support of above to be enclosed	.....

Note: If a Sub-vendor proposed more than one firm for the supply of total flooding inert gas fire extinguishing system, separate data shall be submitted in the above format for each of the proposed suppliers/ agent.

Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(Common Seal).....

*** Please strike off whichever is not applicable.**

J. Compressed Air system:

Sub : Sub-Qualifying Requirements for the Compressed Air System stipulated in Clause No. 15.04.00 of Volume-IV, Part-A, Section-VI of Technical Specification of Bidding Documents.

Sl.No.	Item	Plant 1
--------	------	---------

A) Air Compressor

In line with the Sub-qualifying requirements stipulated in Clause 4.7 of Sub-Section-IA, Part-A, Section-VI, we / our sub-vendor confirm that we/our sub-vendor have designed, manufactured, supplied, erected /supervised erection and commissioned/supervised commissioning of atleast one (1) no. non-lubricated oil free screw type air compressor of minimum capacity 10 NM3/min at rated discharge pressure of 8 Kg./cm2(g) which have been in successfull operation for atleast one (1) year.

1. Name of the Project
and its address where the
system is installed
2. Name of the Client with
address, name of Contact
person(s) with tel.no.
& fax no.
3. Order No. and date
4. Purchase order enclosed Yes/No
5. Name of the Manufacturer & Address
6. Date of commissioning of the
compressors
7. No. of Compressors supplied
8. Whether the scope of work
executed for the aforesaid
compressors included the following
 - a) Designed Yes/No
 - b) Manufactured Yes/No

Sl.No.	Item	Plant 1
	c) Supplied	Yes/No
	d) Erected/supervised erection	Yes/No
	e) Commissioned/supervised commissioning	Yes/No
9.	Brief Technical particulars of the Compressors (Bidder to fill)	
	a) whether the compressor supplied was non lubricated oil free screw/centrifugal type air compressor	
	b) Make & Model	
	c) Capacity	
	i) Flow (NM3/Min)	
	ii) Discharge pressure [Kg/cm2/(g)]	
10.	Whether atleast one (01) compressor have been in successful operation for a period of not less than one (01) year.	
11.	Whether documentary evidence in support of above enclosed?	Yes/No

B) Air Drying plant

We/our sub-vendor further declare that the Air Drying Plant (ADP) to be supplied under the package shall be sourced from manufacturer(s) M/s..... who have manufactured and supplied atleast one (1) no. Air Drying Plant each of capacity 10 NM3/min or more and the type same as offered, which have been in successful operation for atleast one (01) year. The experience details of manufacturer are as follows :

Sl.No.	Item	Plant 1
1.	Name of the Project and its address where the system is installed	.....
2.	Name of the Client with address, name of Contact person(s) with tel.no. & fax no.	.....
3.	Order No. and date	
4.	Purchase order enclosed	Yes/No
5.	Name of the Manufacturer & Address	
6.	Date of commissioning of the Air drying unit	
7.	No. of Air drying unit supplied	
8.	Whether the scope of work executed for the aforesaid Air drying unit included the following	
	a) Manufactured	Yes/No
	b) Supplied	Yes/No
9.	Brief Technical particulars of the Air Drying unit (Bidder to fill)	
	a) Type	
	b) Flow (NM3/Min)	
10.	Whether atleastone (01) air drying plants have been in successful operation for atleast one year.	

11. Whether documentary evidence in support of above enclosed? Yes/No

Date :

(Signature).....

Place :

(Printed Name).....

(Designation).....

(Common seal).....

2.00.00 PROVENNESS DATA FOR ELECTRICAL EQUIPMENTS

**DETAILS OF PROVENNESS OF THE OFFERED GENERATOR AS PER CLAUSE NO. 15.05.01,
VOLUME-IV, PART-A, SECTION-VI OF BIDDING DOCUMENT**

	REFERENCE	OFFERED
	GENERATOR	GENERATOR

- (A) Name Of The Station And Its Location
- (B) Client Name And Its Address, Fax And Tel. No.
- (C) Name And Designation Of The Responsible Person In Client's Organization
- (D) Contract No. & Date
- (E) Date Of Commissioning
- (F) Date Of Commencement Of Successful Operation
- (G) Generator Make
- (H) Model No.
- (I) MVA Rating
- (J) MW Rating
- (K) Rated Voltage
- (N) Thermal Class Of Insulation
- (I) Stator
- (II) Rotor
- (O) Type Of Cooling
- (P) Type Of Excitation System
- (Q) Reference Standard
- (S) Latest/recent certificate from client that the Generator with above Technical parameters is in successful operation in at least one (1) plant for a period not less than one (1) year as on date of award of Great Nicobar Island Gas Engine Power Project Package (Actual time period to be mentioned)

AND CAUSED NO SERIOUS PROBLEM IN PAST, IS ENCLOSED AT ANNEXURE....

TO THIS ATTACHMENT-3K

Signature of authorized signatory.....

DATE : (SIGNATURE)..... (DESIGNATION).....

PLACE :

(PRINTED NAME)..... (COMMON SEAL).....

Signature of authorized signatory.....

**GREAT NICOBAR ISLAND GAS ENGINE POWER
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BIDDING DOCUMENT NO.

Bidder's Name and Address :

To
NTPC Limited
Noida-201301

Sub: We / subvendor..... have designed, manufactured and supplied at least one number(1) of static automatic voltage regulator type Battery Chargers of highest offered rating or above, in at least one (1) industrial installation, which should have been in successful operation for at least one(1) year as per stipulated requirements mentioned at Clause No. 15.05.02 of Volume IV, Part-A, Section-VI of Bidding documents for Battery charger. The details of the same are given below:

Sl.no	Description	Details
01	Numbers and Rating of static auto-matic voltage regulator type battery chargers manufactured and supplied and installed in at one (1) industrial installation and which are in successful operation for at least one (1) year.	
02	Name of the manufacturer and its address	
03	Name of the Manufacturer Plant and its Location	
04	Name of the plant / project & its location for which the manufacturer has supplied the Battery chargers.	
05	Name and Designation of the responsible person in Client's Organisation. Client's name, his address Client's name, his address	
	Fax no & Tel. No	
	e-mail id :	
	website address	
06	Rating of chargers	
07	Number of Units /Qty supplied	
08	Contract No & Date of Award of Contract	
09	Brief Scope of work	
10	Value of Order	
11	Date of commissioning & no of years of service	
12	Whether the Battery chargers are in Successful Operation for atleast one (1) years as on the date of consideration for approval.	Yes / No.
13	Certificate from client in support of above, year and month of Commissioning, period of successful operation and that the above installed by us have caused no serious problem in the past, is furnished this proposal at Annexure.....	

Signature of authorized signatory.....

- Note :**
- 1) Certificates from the client for the successful operation for each of the above shall be Submitted.
 - 2) Supporting documents/ reference data as applicable shall be submitted.

Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(Common seal).....

Signature of authorized signatory.....

- 1) Details Pertaining to Technical Qualification of the Bidder as per Item No. 15.05.03 (a) of Volume IV, Part-A, Section-VI of the Bidding documents :

We hereby confirm that we have designed, manufactured & supplied, at least two (2) numbers (one each at two different installations) of 132 kV or above class transformers of at least 110MVA capacity, which have been in successful operation for at least two (2) years. The details of the same are given below.

Sl. No.	Item Description	Installation 1	Installation 2
1.	Name of the Plant and its location		
2.	Client Name and its Address, Fax and Tel. No.		
3.	Name and Designation of the Responsible Person in Clients Organisation		
4.	Contract No. & Date		
5.	Voltage ratio		
6.	MVA rating of Transformer		
7.	Voltage class of Transformer		
8.	Date of Commissioning of Transformer		
9.	Date of commencement of Successful operation.		
10.	Scope of work executed for aforesaid Transformers included the following		
	(i) Design	YES* / NO*	YES* / NO*
	(ii) Manufacture	YES* / NO*	YES* / NO*
	(iii) Supply	YES* / NO*	YES* / NO*
11.	Certificate(s) from the Client(s) & copy of LOA/P.O. are enclosed along with the bid at Annexure-..... to this Attachment-3A-1	YES* / NO*	YES* / NO*

Signature of authorized signatory.....

2) Details Pertaining to Technical Qualification of the Bidder as per Item No. 15.05.03 (b) of Volume IV, Part-A, Section-VI of the Bidding documents :

In accordance with Clause 15.05.03 (b) of Technical specification, We hereby confirm that we have our own facilities for conducting all routine and type tests on Transformers as per IS : 2026 (except short circuit test). The details of the same are given below:

Sl. No.	Name of Test	YES* / NO*

Note:

1. Bidder's to use their own format for giving details of all routine and type test facilities available with them.
2. Certificates from client (s) must also be attached as Annexure ..to this Attachment-3K.

Signature of authorized signatory.....

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3) . Details Pertaining to Technical Qualification of the Bidder as per Item No. 15.05.03 (c) of Volume IV, Part-A, Section-VI of the Bidding documents :

In accordance with clause 15.05.03 (c) , we hereby confirm that we have manufactured 90 MVA, 132 kV or higher rating oil filled transformer, which have been successfully short circuit tested. The details of the same are given below:

Sl. No.	Item Description	Installation#1 & 2
1.	Name of the station and its location	
2.	Client Name and its Address, including Tel. No. and Fax no.	
3.	Name and designation of the responsible person in Clients organisation.	
4.	Contract No. & Date	
5.	Voltage ratio	
6.	MVA rating of Transformer	
7.	Voltage class of Transformer	
	Short Circuit test carrying agency (Test Lab)- Name and Address	
8.	Date of Short Circuit test	
9.	Short circuit test conducted successfully	YES* / NO*
10.	Certificate(s) from the Client(s) & copy of LOA/P.O. are enclosed along with the bid at Annexure to this Attachement-3K	YES* / NO*

Signature of authorized signatory.....

**DETAILS OF PROVENNESS OF LT SWITCHGEAR AS PER CLAUSE NO. 15.05.04,
VOLUME-IV, PART-A, SECTION-VI OF BIDDING DOCUMENT**

A) Sub: We / subvendor..... have designed, manufactured, supplied LT SWITCHGEAR and these panels should have been in successful operation for at least two (2) years. as per stipulated requirements mentioned at Clause No. 15.05.04 of Volume IV , Part-A, Section-VI of Bidding documents for LT Switchgear . The details of the same are given below:

Sl.no	Description	Details
1.1	No. of Air circuit breaker panels and/or draw out motor control centre panels manufactured and supplied, under a single order, with fault rating of at least 45kA for one (1) second and 105kA peak which are in successful operation for at least two (2) years.(under Route 1) .	
01	Name of the manufacturer and its address	
02	Name of the manufacturer Plant and its Location	
03	Name of the plant / project and its location for which the Air circuit breaker panels and/or draw out motor control centre panels / LT switchgear was supplied.	
04	Name and Designation of the responsible person in Client's Organisation.Client's name, his address Client's name, his address	
	Fax no & Tel. No	
	e-mail id :	
	website address	
05	Whether manufactured and supplied the referred Air Circuit breaker panels / MCC panels	Yes / No
06	Number of Units / Qty supplied	
07	Contract No & Date of Award of Contract	
08	Brief Scope of work	
09	Value of Order	
10	Draw out type Air Circuit Breaker panels and/or draw out motor control centre panels having fault rating (kA rms)	
	Time (Sec.)	
	KA (Peak)	
11	No. of draw out type MCC panels supplied	
12	No. of draw out type Air Circuit breaker panels supplied	
13	Date of commissioning & no of years of service	
14	Whether the Air circuit breaker panels and/or draw out motor control centre panels are in Successful	Yes / No.

Signature of authorized signatory.....

	Operation for atleast Two (2) years as on the date of consideration for approval but not later than six months after award date of the package.	
15	Certificate from client in support of above , year and month of Commissioning, period of successful operation and that the above are installed by us have caused no serious problem in the past, is furnished this proposal at Annexure.....	

Sl.no	Description	Details
1.2	No. of Air circuit breakers having fault rating of at least 45kA rms BREAKING, 105kA peak MAKING and 45kA withstand for one (1) second, and their associated draw out type Air circuit breaker panels having fault rating of at least 45kA for one (1) second and 105kA peak , manufactured and supplied which are in successful operation for at least two (2) years.(under Route 1)	
01	Name of the manufacturer and its address	
02	Name of the manufacturer Plant and its Location	
03	Name of the plant / project for which the Air Circuit Breakers was supplied and its location	
04	Name and Designation of the responsible person in Client's Organisation.Client's name, his address Client's name, his address	
	Fax no & Tel. No	
	e-mail id :	
	website address	
05	Whether manufactured and supplied the referred Air Circuit Breakers and their associated draw out type Air Circuit Breaker panels	Yes / No
06	Number of Units / Qty supplied	
07	Contract No & Date of Award of Contract	
08	Brief Scope of work	

Signature of authorized signatory.....

09	Value of Order	
10	Air Circuit Breakers having fault rating	
	(i) Rated current (A)	
	ii) Breaking Capacity (KA rms)	
	iii) Making Capacity (KA peak)	
11	Draw out type Air Circuit Breaker panels having fault rating (kA rms)	
	Time (Sec.)	
	KA (Peak)	
12	No. of draw out type MCC panels supplied	
13	No. of draw out type Air Circuit breaker panels supplied	
14	Date of commissioning & no of years of service	
15	Whether the Air circuit breaker panels and/or draw out motor control centre panels are in Successful Operation for atleast Two (2) years as on the date of consideration for approval but not later than six months after award date of the package.	Yes / No.
16	Certificate from client in support of above , year and month of Commissioning, period of successful operation and that the above are installed by us have caused no serious problem in the past, is furnished this proposal at Annexure.....	

.Sl.no	Description	Details
1.3	No. of Air circuit breaker panels and/or draw out motor control centre panels manufactured and supplied, under a single order, with fault rating of at least 45kA for one(1) second and 105kA peak which are in successful operation for at least two (2) years.(under Route 2) .	
01	Name of the manufacturer and its address	
02	Name of the manufacturer Plant and its Location	
03	Name of the plant / project for which the Air circuit breaker panels and/or draw out motor control centre panels manufactured and supplied & its location	
04	Name and Designation of the responsible person in Client's Organisation. Client's name, his address Client's name, his address	
	Fax no & Tel. No	
	e-mail id :	
	website address	

Signature of authorized signatory.....

05	Whether manufactured and supplied the referred Air Circuit breaker panels / MCC panels	Yes / No
06	Number of Units / Qty supplied	
07	Contract No & Date of Award of Contract	
08	Brief Scope of work	
09	Value of Order	
10	Draw out type Air Circuit Breaker panels and/or draw out motor control centre panels having fault rating (kA rms)	
	Time (Sec.)	
	KA (Peak)	
11	No. of draw out type Air Circuit breaker panels supplied	
12	Date of commissioning & no of years of service	
13	Whether the Air circuit breaker panels and/or draw out motor control centre panels are in Successful Operation for atleast Two (2) years as on the date of consideration for approval but not later than six months after award date of the package.	Yes / No.
14	Certificate from client in support of above , year and month of Commissioning, period of successful operation and that the above are installed by us have caused no serious problem in the past, is furnished this proposal at Annexure.....	

.Sl.no	Description	Details
1.4	No. of Air circuit breakers having fault rating of at least 45kA rms BREAKING, 105kA peak MAKING and 45kA withstand for one (1) second, and their associated draw out type Air circuit breaker panels having fault rating of at least 45kA for one (1) second and 105kA peak , manufactured and supplied which are in successful operation for at least two (2) years.(under Route 2)	
01	Name of the manufacturer and its address	
02	Name of the manufacturer Plant and its Location	
03	Name of the plant / project for which the Air circuit breakers supplied & its location	
04	Name and Designation of the responsible person in Client's Organisation.Client's name, his address Client's name, his address	
	Fax no & Tel. No	
	e-mail id :	

Signature of authorized signatory.....

	website address	
05	Whether manufactured and supplied the referred Air Circuit Breakers and their associated draw out type Air Circuit Breaker panels	Yes / No
06	Number of Units / Qty supplied	
07	Contract No & Date of Award of Contract	
08	Brief Scope of work	
09	Value of Order	
10	Air Circuit Breakers having fault rating	
	(ii) Rated current (A)	
	ii) Breaking Capacity (KA rms)	
	iii) Making Capacity (KA peak)	
11	Draw out type Air Circuit Breaker panels having fault rating Falult rating (kA rms)	
	Time (Sec.)	
	KA (Peak)	
12	No. of draw out type Air Circuit breaker panels supplied	
13	Date of commissioning & no of years of service	
14	Whether the Air circuit breaker panels and/or draw out motor control centre panels are in Successful Operation for atleast Two (2) years as on the date of consideration for approval but not later than six months after award date of the package.	Yes / No.
15	Certificate from client in support of above , year and month of Commissioning, period of successful operation and that the above are installed by us have caused no serious problem in the past, is furnished this proposal at Annexure.....	

Sl.no	Description	Details
1.5	Bidder's / Sub Vendor's Associate or Collaborator or Technology Provider or Licensor data to meet qualifying requirement stipulated in Route 1 for sourcing of Air Circuit Breakers. (under Route-2)	
1.5.1	No. of Air circuit breaker panels and/or draw out motor control centre panels manufactured and supplied, under a single order, with fault rating of at least 45kA for one (1) second and 105kA peak which	

Signature of authorized signatory.....

	are in successful operation for at least two (2) years. (under Route 2)	
01	Name of the manufacturer and its address(Associate or collaborator or Technology Provider of licensor)	
02	Name of the manufacturer Plant and its Location	
03	Name of the plant / project for which the manufacturer and its address(Associate or collaborator or Technology Provider of licensor Air circuit breakers supplied & its location.	
04	Name and Designation of the responsible person in Client's Organisation.Client's name, his address Client's name, his address	
	Fax no & Tel. No	
	e-mail id :	
	website address	
05	Whether manufactured and supplied the referred Air Circuit breaker panels / MCC panels	Yes / No
06	Number of Units / qty supplied	
07	Contract No & Date of Award of Contract	
08	Brief Scope of work	
09	Value of Order	
10	Draw out type Air Circuit Breaker panels and/or draw out motor control centre panels having fault rating (kA rms)Fault rating (kA rms)	
	Time (Sec.)	
	KA (Peak)	
11	No. of draw out type MCC panels supplied	
12	No. of draw out type Air Circuit breaker panels supplied	
13	Date of commissioning & no of years of service	
14	Whether the Air circuit breaker panels and/or draw out motor control centre panels are in Successful Operation for atleast Two (2) years as on the date of consideration for approval but not later than six months after award date of the package.	Yes / No.
15	Certificate from client in support of above , year and month of Commissioning, period of successful operation and that the above are installed by us have caused no serious problem in the past, is furnished this proposal at Annexure.....	

Signature of authorized signatory.....

.Sl.no	Description	Details
1.5.2	No. of Air circuit breakers having fault rating of at least 45kA rms BREAKING, 105kA peak MAKING and 45kA withstand for one (1) second, and their associated draw out type Air circuit breaker panels having fault rating of at least 45kA for one (1) second and 105kA peak , manufactured and supplied which are in successful operation for at least two (2) years. (under Route 2)	
01	Name & address of Manufacturer (Associate or Collaborator or Technology Provider or Licensor)	
02	Name of the Manufacturer (Associate or Collaborator or Technology Provider or Licensor) Plant and its Location	
03	Name of the plant / project for which the manufacturer and its address(Associate or collaborator or Technology Provider of licensor Air circuit breakers supplied & its location.	
04	Name and Designation of the responsible person in Client's Organisation.Client's name, his address Client's name, his address	
	Fax no & Tel. No	
	e-mail id :	
	website address	
05	Whether manufactured and supplied the referred Air Circuit Breakers and their associated draw out type Air Circuit Breaker panels	Yes / No
06	Number of Units / qty supplied	
07	Contract No & Date of Award of Contract	
08	Brief Scope of work	
09	Value of Order	
10	Air Circuit Breakers having fault rating	
	(iii) Rated current (A)	
	ii)Breaking Capacity (KA rms)	
	iii)Making Capacity (KA peak)	
11	Draw out type Air Circuit Breaker panels having fault rating Falult rating (kA rms)	
	Time (Sec.)	
	KA (Peak)	
12	No. of draw out type MCC panels supplied	
13	No. of draw out type Air Circuit breaker panels supplied	
14	Date of commissioning & no of years of service	

Signature of authorized signatory.....

15	Whether the Air circuit breaker panels and/or draw out motor control centre panels are in Successful Operation for atleast Two (2) years as on the date of consideration for approval but not later than six months after award date of the package.	Yes / No.
16	Certificate from client in support of above , year and month of Commissioning, period of successful operation and that the above are installed by us have caused no serious problem in the past, is furnished this proposal at Annexure.....	
17	The letter of technical support by Associate/ Collaborator / Technology Provider / Licensor provided (under Route-2).	Yes / No
1.6	Bidder/ Sub Vendor should have established manufacturing facility for draw out type Air Circuit Breaker Panels and draw out type Motor Control Centre Panels in India. Further, all the panels for this project shall be manufactured and supplied from the Indian manufacturing facility(Under Route-2)	Yes / No

- Note :**
- 1) Certificates from the client for the successful operation for each of the above shall be Submitted.
 - 2) Supporting documents/ reference data as applicable shall be submitted.

Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(Common seal).....

Signature of authorized signatory.....

Sub : We / subvendor..... have designed, manufactured, supplied 33 KV GIS switchgear and these panels should have been in successful operation for at least two (2) years as per stipulated requirements mentioned at Clause No. 15.05.05 of Volume IV, Part-A, Section-VI of Bidding documents for 33kV GIS SWITCHGEARS. The details of the same are given below.

Sl.no	Description	Details
1.1	No. of 33 kV or above Switchgear panels manufactured and supplied with fault rating of at least 40kA for one (1) second and 100kA peak, which are in successful operation for at least two (2) years	
01	Name of the manufacturer and its address	
02	Name of the Manufacturer Plant and its Location	
03	Name of the plant / project for which the manufacturer supplied & its location.	
04	Name and Designation of the responsible person in Client's Organisation. Client's name, his address Client's name, his address	
	Fax no & Tel. No	
	e-mail id :	
	website address	
05	Voltage rating of Switchgear panels manufactured & supplied	
06	Number of Units / Qty supplied	
07	Contract No & Date of Award of Contract	
08	Brief Scope of work	
09	Value of Order	
10	33 kV or above Switchgear panels manufactured and supplied with fault rating of (kA rms)	
	Time (Sec.)	
	KA (Peak)	
11	Date of commissioning & no of years of service	
12	Whether the 33 kV or above Switchgear panels manufactured and supplied with fault rating of at least 40kA for one (1) second and 100kA peak, which are in successful operation for at least two (2) as on the date of consideration for approval but not later than six months after award date of the package.	Yes / No.
13	Certificate from client in support of above , year and month of Commissioning, period of successful operation and that the above are installed by us have caused no serious problem in the past, is furnished this proposal at Annexure.....	

Signature of authorized signatory.....

-
- Note :**
- 1) Certificates from the client for the successful operation for each of the above shall be Submitted.
 - 2) Supporting documents/ reference data as applicable shall be submitted.

Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(Common seal).....

Signature of authorized signatory.....

Sub : We / subvendor..... have designed, manufactured, supplied at least one (1) number of highest offered rating or above of high discharge type plante positive plante type battery (in case bidder offers Lead Acid plante type battery) in at least one (1) industrial installation, which should have been in successful operation for at least one(1) year. as per stipulated requirements mentioned at Clause No. 15.05.06 of Volume IV, Part-A, Section-VI of Bidding documents for Battery.

Sl.no	Description	Details
1.1	Numbers, Rating and type of the Battery manufactured and supplied and installed in at one (1) industrial installation and which are in successfuloperation for at least one (1) year	
01	Name of the manufacturer and its address	
02	Name of the manufacturer Plant and its Location	
03	Name of the plant / project & its location for which the manufacturer has supplied the battery	
04	Name and Designation of the responsible person in Client's Organisation. Client's name, his address Client's name, his address	
	Fax no & Tel. No	
	e-mail id :	
	website address	
05	Number of Units / Qty supplied	
06	Contract No & Date of Award of Contract	
07	Brief Scope of work	
08	Value of Order	
09	Date of commissioning & no of years of service	
10	Certificate from client in support of above , year and month of Commissioning, period of successful operation and that the above are installed by us have caused no serious problem in the past, is furnished this proposal at Annexure.....	

- Note :**
- 1) Certificates from the client for the successful operation as applicable shall be Submitted.
 - 2) Supporting documents/ reference data as applicable shall be submitted.

Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(Common seal).....

Signature of authorized signatory.....

Sub : We / subvendor..... have designed, manufactured, supplied at the HT Power cables, as per stipulated requirements mentioned at Clause No. 15.05.07 (A) of Volume IV, Part-A, Section-VI of Bidding documents for **Sub-Qualifying Requirement of HT Cables (3.3kV or above but below 33kV) :**

we declare that the supplier/sub-vendor have manufactured and supplied the following cables.

- (i) Atleast 50 Kms of XLPE insulated power cables of 6.35/11 KV or higher voltage grade, executed in one or more limited to maximum of three orders.
- (ii) Atleast one (1) Km of flame retardant low smoke cables of any voltage level.
- (A) The details of above cables at (i) are given as under* :

Sl.no	Description	Details
1.1	supplier/sub-vendor have manufactured and supplied the following cables. i) XLPE insulated power cables of 6.35/11 KV or higher voltage grade, executed in one or more orders. ii) flame retardant low smoke cables of any voltage level.	
01	Name of the manufacturer and its address	
02	Name of the Manufacturer Plant and its Location	
03	Name of the plant / project & its location for which the manufacturer has supplied the HT Power cables	
04	Name and Designation of the responsible person in Client's Organisation. Client's name, his address Client's name, his address	
	Fax no & Tel. No	
	e-mail id :	
	website address	
05	Qty of cable supplied	
06	Contract No & Date of Award of Contract	
07	Brief Scope of work	
08	Value of Order	
09	Date of commissioning & no of years of service	
10	Details of XLPE insulated powercables of 6.35/11 KV or higher voltage grade	
	i) Manufactured	Yes/No
	ii) Supplied	Yes/No

Signature of authorized signatory.....

	iii) Rated voltage of cable	..... KV
	iv) Type and size of Cable	
	Total Quantity supplied	..... Km
10	Certificate from client in support of above , year and month of Commissioning, period of successful operation and that the above are installed by us have caused no serious problem in the past, is furnished this proposal at Annexure.....	

Sl.no	Description	Details
1.1	supplier/sub-vendor have manufactured and supplied the following cables. ii) flame retardant low smoke cables of any voltage level.	
01	Name of the manufacturer and its address	
02	Name of the Manufacturer Plant and its Location	
03	Name of the plant / project & its location for which the manufacturer has supplied the HT Power cables	
04	Name and Designation of the responsible person in Client's Organisation. Client's name, his address Client's name, his address	
	Fax no & Tel. No	
	e-mail id :	
	website address	
05	Qty of cable supplied	
06	Contract No & Date of Award of Contract	
07	Brief Scope of work	
08	Value of Order	
09	Date of commissioning & no of years of service	
10	Details of XLPE insulated powercables of 6.35/11 KV or higher voltage grade	
	i) Manufactured	Yes/No

Signature of authorized signatory.....

	ii) Supplied	Yes/No
	iii) Rated voltage of cable	..... KV
	iv) Type and size of Cable	
10	Certificate from client in support of above, year and month of Commissioning, period of successful operation and that the above are installed by us have caused no serious problem in the past, is furnished this proposal at Annexure.....	

Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(Common seal).....

Note :

- Continuation sheets of like size and format may be used as per the Sub-vendor's requirement and shall be annexed to this Schedule.
- Sub-vendor is required to attach necessary documents like copies of work order, completion certificates, agreements, drawings etc. in support of
* If the quantity ordered is less than 50 Km in one order than please furnish the details for other orders in same format.

Signature of authorized signatory.....

Sub : We / subvendor..... have designed, manufactured, supplied at the HT Power cables, as per stipulated requirements mentioned at Clause No. 15.05.07 (B) of Volume IV, Part-A, Section-VI of Bidding documents for **Sub-Qualifying Requirement of HT Cables (33kV) :**

we declare that the supplier/sub-vendor have manufactured and supplied the following cables.

- (i) Atleast 20 Kms of XLPE insulated power cables of 19/33 KV or higher voltage grade, executed in one or more limited to maximum of three orders.
- (ii) Atleast one (1) Km of flame retardant low smoke cables of any voltage level.
- (A) The details of above cables at (i) are given as under* :

Sl.no	Description	Details
1.1	supplier/sub-vendor have manufactured and supplied the following cables. i) XLPE insulated power cables of 19/33 KV or higher voltage grade, executed in one or more orders. ii) flame retardant low smoke cables of any voltage level.	
01	Name of the manufacturer and its address	
02	Name of the Manufacturer Plant and its Location	
03	Name of the plant / project & its location for which the manufacturer has supplied the HT Power cables	
04	Name and Designation of the responsible person in Client's Organisation. Client's name, his address Client's name, his address	
	Fax no & Tel. No	
	e-mail id :	
	website address	
05	Qty of cable supplied	
06	Contract No & Date of Award of Contract	
07	Brief Scope of work	
08	Value of Order	
09	Date of commissioning & no of years of service	
10	Details of XLPE insulated powercables of 19/33 KV or higher voltage grade	
	i) Manufactured	Yes/No
	ii) Supplied	Yes/No
	iii) Rated voltage of cable	..... KV
	iv) Type and size of Cable	

Signature of authorized signatory.....

	Total Quantity supplied	..... Km
10	Certificate from client in support of above , year and month of Commissioning, period of successful operation and that the above are installed by us have caused no serious problem in the past, is furnished this proposal at Annexure.....	

Sl.no	Description	Details
1.1	supplier/sub-vendor have manufactured and supplied the following cables. ii) flame retardant low smoke cables of any voltage level.	
01	Name of the manufacturer and its address	
02	Name of the Manufacturer Plant and its Location	
03	Name of the plant / project & its location for which the manufacturer has supplied the HT Power cables	
04	Name and Designation of the responsible person in Client's Organisation. Client's name, his address Client's name, his address	
	Fax no & Tel. No	
	e-mail id :	
	wedsite address	
05	Qty of cable supplied	
06	Contract No & Date of Award of Contract	
07	Brief Scope of work	
08	Value of Order	
09	Date of commissioning & no of years of service	
10	Details of XLPE insulated powercables of 19/33 KV or higher voltage grade	

Signature of authorized signatory.....

	i) Manufactured	Yes/No
	ii) Supplied	Yes/No
	iii) Rated voltage of cable	..... KV
	iv) Type and size of Cable	
10	Certificate from client in support of above , year and month of Commissioning, period of successful operation and that the above are installed by us have caused no serious problem in the past, is furnished this proposal at Annexure.....	

Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(Common seal).....

Note :

- Continuation sheets of like size and format may be used as per the Sub-vendor's requirement and shall be annexed to this Schedule.
- Sub-vendor is required to attach necessary documents like copies of work order, completion certificates, agreements, drawings etc. in support of
* If the quantity ordered is less than 20 Km in one order than please furnish the details for other orders in same format.

Signature of authorized signatory.....

Sub : We / subvendor..... have designed, manufactured, supplied at least one (1) number of DG set of rating not less than 1500 kVA, in at least one (1) installation, which should be in successful operation for at least one (1) year as per stipulated requirements mentioned at Clause No. 15.05.08 of Volume IV, Part-A, Section-VI of Bidding documents for **Sub-Qualifying Requirement of DG set.**

we furnish details of DG Sets as below :-

Sl.no	Description	Details
1.1	Details of DG set	
01	Name of the manufacturer and its address	
02	Name of the Manufacturer Plant and its Location	
03	Name of the plant / project & its location for which the manufacturer has supplied the DG set	
04	Name and Designation of the responsible person in Client's Organisation. Client's name, his address Client's name, his address	
	Fax no & Tel. No	
	e-mail id :	
	website address	
05	No. of DG sets supplied	
06	Contract No & Date of Award of Contract	
07	Brief Scope of work	
08	Value of Order	
09	Date of commissioning & no of years of service	
10	Rating of DG sets(not less than 1500 KVA)	
	i)Make of Alternator in the supplied DG set	
	ii) Make of Engine in the supplied DG set	
	iii) Rated voltage of cable	..... KV
	iv)Type and size of Cable	
11	Certificate from client in support of above , year and month of Commissioning, period of successful operation and that the above are installed by us have caused no serious problem in the past, is furnished this proposal at Annexure.....	

Signature of authorized signatory.....

- Note :**
- 1) Certificates from the client for the successful operation as applicable shall be Submitted.
 - 2) Supporting documents/ reference data as applicable shall be submitted.

Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(Common seal).....

Signature of authorized signatory.....

Sub QR Data to be filled in to meet the proveness requirements (Refer Clause No. 15.05.09 of Volume IV , Part-A, Section-VI. For GENERATOR TRANSFORMERS AND AUXILIARY OIL FILLED TRANSFORMERS .

- (I) We hereby confirm that We/Subvendor M/s have manufactured & supplied atleast two (2) numbers (one each at two different installations) of 16MVA, 33 KV or higher rating oil filled transformers which have been in successful operation for a period of atleast two (2) years as per stipulated requirements mentioned at Clause No. 15.05.09.01 of Volume IV , Part-A of Section-VI. The details of the same are given below:

Sl. No. Item Description Installation No. 1

Sl. No.	Item Description	Installation#1 & 2
1.	Name of the station and its location	
2.	Client Name and its Address, including Tel. No. and Fax no.	
3.	Name and designation of the responsible person in Clients organisation.	
4.	Contract No. & Date	
5.	Voltage ratio	
6.	MVA rating of Transformer	
7.	Voltage class of Transformer	
	Short Circuit test carrying agency (Test Lab)- Name and Address	
8.	Date of Short Circuit test	
9.	Short circuit test conducted successfully	YES* / NO*
10	Date of commissioning of Transformers	
11	Date of commencement of successful operations & No of Years in successful operation	
12	Scope of work executed for aforesaid transformers included the following :	
	(i) Manufactured	Yes/No
	(ii) Supplied	Yes/No

Signature of authorized signatory.....

10.	Certificate(s) from the Client(s) & copy of LOA/P.O. are enclosed along with the bid at Annexure to this Attachment-3K	YES* / NO*

II. We hereby further confirm that we/sub-vendor M/s have our/his own facilities for conducting all routine and type tests on transformers as per IS:2026 (except short circuit test) as per Clause No. 15.05.09.02 of Volume IV , Part-A of Section-VI . The details of the same are given below:

Sl. No.	Name of Test	Yes/No
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Note :

- 1) Sub-vendor to use their own performa for giving details of all routine and type test facilities available with them.
- 2) Certificates from client(s) must also be attached as Annexure..... to this Attachment-3K.

Signature of authorized signatory.....

III. We/sub-vendor hereby confirm that 16MVA, 33KV Class or higher rated oil filled transformer manufactured by We/sub-vendor have been successfully short circuit tested as per requirement of Clause No. 15.05.09.03 of Volume IV , Part-A of Section-VI , Part-A of Section-VI. The details of the same are given below:

Sl. No. Item Description Details

Sl. No.	Item Description	Installation#1 & 2
1.	Name of the station and its location	
2.	Client Name and its Address, including Tel. No. and Fax no.	
3.	Name and designation of the responsible person in Clients organisation.	
4.	Contract No. & Date	
5.	Voltage ratio	
6.	MVA rating of Transformer	
7.	Voltage class of Transformer	
8	Short Circuit test carrying agency (Test Lab)- Name and Address	
9	Date of Short Circuit test	
10.	Short circuit test conducted successfully	YES* / NO*
11	Certificate(s) from the Client(s) & copy of LOA/P.O. are enclosed along with the bid at Annexure to this Attachment-3K	

Note :

- 1) Sub-vendor may provide any additional information regarding short circuit test on transformers and enclose along with the proposal at Annexure..... to this Attachment-3K.
- 2) If needed Sub-vendor may use own performa for giving necessary details regarding short circuit test conducted on transformers and enclose with the proposal at Annexure..... to this Attachment-3K.

Date :

Place :

(Signature).....

(Printed Name).....

(Designation).....

(Common seal).....

Signature of authorized signatory.....

Sub : Sub-Qualifying Requirements for 132 kV Cables & cable accessories
(Refer Clause No. 15.05.10 of Volume IV , **Part-A, Section-VI**):

(a) Sub-Qualifying Requirements for 132 kV Cables:

The bidder/Sub-vendor should have manufactured and supplied following cables:

Atleast 1kms of XLPE insulated power cables of 132kV or higher voltage grade,
executed in one or more orders and which must have been in successful operation for
a minimum period of two (2) years -

Sl.no	Description	Details
1.1	supplier/sub-vendor have manufactured and supplied the following cables. i) XLPE insulated power cables of 132 KV or higher voltage grade, executed in one or more orders.	
01	Name of the manufacturer and its address	
02	Name of the Manufacturer Plant and its Location	
03	Name of the plant / project & its location for which the manufacturer has supplied the EHT Power cables.	
04	Name and Designation of the responsible person in Client's Organisation. Client's name, his address Client's name, his address	
	Fax no & Tel. No	
	e-mail id :	
	website address	
05	Qty of cable supplied	
06	Contract No & Date of Award of Contract	
07	Brief Scope of work	
08	Value of Order	
09	Date of commissioning & no of years of service	
10	Details of XLPE insulated powercables of 132 KV or higher voltage grade	
	i) Manufactured	Yes/No
	ii)Supplied	Yes/No
	iii) Rated voltage of cable	..... KV
	iv)Type and size of Cable	
	Total Quantity supplied	..... Km

Signature of authorized signatory.....

10	Certificate from client in support of above , year and month of Commissioning, period of successful operation and that the above are installed by us have caused no serious problem in the past, is furnished this proposal at Annexure.....	
----	--	--

Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(Common seal).....

Signature of authorized signatory.....

(b) Sub-Qualifying Requirements for 132 kV Cable Accessories:

The Bidder/Sub-vendor should have manufactured and supplied minimum fifteen (15) nos. of cable Accessories supplied of 132 kV grade cable s or above, and which must have been in successful operation for a minimum period of two (2) years .

Sl.no	Description	Details
1.1	supplier/sub-vendor have manufactured and supplied the following 132KV cables Accessories .	
01	Name of the manufacturer and its address	
02	Name of the Manufacturer Plant and its Location	
03	Name of the plant / project & its location for which the manufacturer has supplied the	
04	Name and Designation of the responsible person in Client's Organisation. Client's name, his address Client's name, his address	
	Fax no & Tel. No	
	e-mail id :	
	website address	
05	Qty of cable Accessories supplied	
06	Contract No & Date of Award of Contract	
07	Brief Scope of work	
08	Value of Order	
09	Date of commissioning & no of years of service	
10	Details of 132 KV or higher voltage grade Accessories	
	i) Designed , Manufactured	Yes/No
	ii)Supplied	Yes/No
	iii) Rated voltage of cable	..... KV
	iv)Type and size of Cable	
	Total Quantity supplied	..... Km
11	No. of each accessories supplied for 132 kV grade cable or higher which should be in successful operation for atleast two (2) years	
	a) Straight through joints	
	b) Cable termination	

Signature of authorized signatory.....

12	Certificate from client in support of above , year and month of Commissioning, period of successful operation and that the above are installed by us have caused no serious problem in the past, is furnished this proposal at Annexure.....	

Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(Common seal).....

Signature of authorized signatory.....

**(Experience Details - Applicable to all the Bidders)
ATTACHMENT 3K- DOCUMENT(SWITCHYARD) :**

Sub: Sub-Qualifying Requirements for the 132KV GIS Equipment

In order to satisfy the requirement of as indicated in Technical Specification Clause No. 15.05.11 (I) of Volume IV , **Part-A, Section-VI**, We/ Sub vendor hereby confirm that M/s..... is a manufacturer who have designed, manufactured, Supplied, erected/ supervised erection, tested/ supervised testing and commissioned/ supervised commissioning of one (1) Gas Insulated Switchgear (GIS) equipment(s) installation having at least two (2) bays of 132kV or above voltage class with short circuit current of not less than 40 kA for 1 second, which are in successful operation for a period of minimum 3 months.

The details are given below for 132kV or above class GIS as applicable:

Sl. No.	Item Description	Details
1.	Name and Address of Manufacturer and Name of contact person with email ID, Telephone & Fax Nos.	
2	Location of manufacturer plant & its address, Telephone & Fax Nos.	
3	Name of the plant / project & its location for which the manufacturer has supplied the 132KV GIS Bays	
4.	Client Name and its Address, including Tel. No. and Fax no.	
5.	Name and designation of the responsible person in Clients organisation.	
6	Name & locatin of the substation / switchyard	
7.	i)Contract No. & Date	
	ii)Brief scope of work	
	iii) Value of Order	
08	Scope of work for the aforesaid contract includes the following	
	(i) Manufactured	Yes/No
	(ii) Supplied	Yes/No

Signature of authorized signatory.....

	iii) erected/ supervised erection, tested/ supervised testing and commissioned/ supervised commissioning	Yes/No
09	i)No. of bays of 132kV or above voltage class with short circuit current of not less than 40 kA for 1 second supplied	
	ii)Voltage Level (in KV)	
	iii)Whether suitable for Gas insulated Substation/Switchyard	Yes*/No*
10	Date of Commissioning	
11	Date of commencement of successful Operation & No of years of service	
12	Whether bays of 132kV or above voltage class with short circuit current of not less than 40 kA for 1 second supplied which are in successful operation.	Yes / No
13.	Client(s) certificate(s) enclosed in support of stated experience above at Annexure.....to this Attachment-3K (Use separate sheet for each experience/Contract)	YES* / NO*

Note:

For the purpose of qualifying requirement, one no. of bay shall be considered as comprising of at least one circuit breaker(3phase), two disconnector (3phase) and current transformers (3phase).

Date:

(Signature).....

Place:

(Printed Name).....

(Designation).....

(Common Seal).....

Signature of authorized signatory.....

Sub: Sub-Qualifying Requirements for the 132KV Instrument Transformers (Current Transformers / Capacitor Voltage Transformers) as Applicable:

In order to satisfy the requirement of as indicated in Technical Specification, Clause No. 15.05.11 (II) of Volume IV , **Part-A, Section-VI** , We/ Sub vendor hereby confirm that M/s.....
..... is a manufacturer who have manufactured and supplied minimum fifteen (15) nos. of single phase Instrument Transformers (**Current Transformers / capacitor Voltage Transformers**) of 132KV or above Voltage Class suitable for Air Insulated Substation/Switchyard which are in successful operation for minimum two (2) years.

The details are given below for 132kV or above class Instrument Transformers (Current Transformes / Capacitor Voltage Transformer as applicable:

Sl. No.	Item Description	Details
1.	Name and Address of Manufacturer and Name of contact person with email ID, Telephone & Fax Nos.	
2	Location of manufacturer plant & its address, Telephone & Fax Nos.	
3	Name of the plant / project & its location for which the manufacturer has supplied the 132KV Instrument Transformers (Current Transformers / Capacitor Voltage Transformers	
4.	Client Name and its Address, including Tel. No. and Fax no.	
5.	Name and designation of the responsible person in Clients organisation.	
6	Name & locatin of the substation / switchyard	
7.	i)Contract No. & Date	
	ii)Brief scope of work	
	iii) Value of Order	
08	Scope of work for the aforesaid contract includes the following	
	(i) Manufactured	Yes/No

Signature of authorized signatory.....

	(ii) Supplied	Yes/No
	iii) Type test	Yes/No
09	i) No. of single phase Instrument Transformers (Current Transformers / capacitor Voltage Transformers) supplied	
	ii) Voltage Level (in KV)	
	iii) Whether suitable for Air insulated Substation/Switchyard	Yes*/No*
10	Date of Commissioning	
11	Date of commencement of successful Operation & No of years of service	
12	Whether single phase Instrument Transformers (Current Transformers / capacitor Voltage Transformers) supplied which are in successful operation for at least two (2) years .	Yes / No
13.	Client(s) certificate(s) enclosed in support of stated experience above at Annexure.....to this Attachment- 3K (Use separate sheet for each experience/Contract)	YES* / NO*

Date:

(Signature).....

Place:

(Printed Name).....

(Designation).....

(Common Seal).....

Signature of authorized signatory.....

Sub: Sub-Qualifying Requirements for the 132 KV Disconnectors :

In order to satisfy the requirement as indicated in Technical Specifications, Clause No. 15.05.11 (III) of Volume IV , **Part-A, Section-VI** , We hereby confirm that M/s is a manufacturer who have manufactured and supplied at least five (05) nos. of Three phase Disconnectors of 132 KV or above Voltage Class suitable for Air Insulated Substation/Switchyard which are in successful operation for minimum two (2) years. The details are given below:

Sl. No.	Item Description	Details
1.	Name and Address of Manufacturer and Name of contact person with email ID, Telephone & Fax Nos.	
2	Location of manufacturer plant & its address, Telephone & Fax Nos.	
3.	Client Name and its Address, including Tel. No. and Fax no.	
4	Name of the plant / project & its location for which the manufacturer has supplied the 132KV Disconnectors	
5.	Name and designation of the responsible person in Clients organisation.	
6	Name & locatin of the substation / switchyard	
7.	i)Contract No. & Date	
	ii)Brief scope of work	
	iii) Value of Order	
08	Scope of work for the aforesaid contract includes the following	
	(i) Manufactured	Yes/No
	(ii) Supplied	Yes/No
	iii) Type test	Yes/No
09	i)No. of Three phase disconnectors supplied	

Signature of authorized signatory.....

	ii)Voltage Level (in KV)	
10	Date of Commissioning	
11	Date of commencement of successful Operation & No of years of service	
12	Whether Three phase disconnectors supplied which are in successful operation for at least two (2) years.	Yes / No
13.	Client(s) certificate(s) enclosed in support of stated experience above at Annexure.....to this Attachment-3K.(Use separate sheet for each experience/Contract)	YES* / NO*

Date:

(Signature).....

Place:

(Printed Name).....

(Designation).....

(Common Seal).....

Signature of authorized signatory.....

Sub: Sub-Qualifying Requirements for the 132 KV SURGE ARRESTER

In order to satisfy the requirement as indicated in Technical Specifications, Clause No. 15.05.11 (IV) of Volume IV , **Part-A, Section-VI** , We hereby confirm that M/s is a manufacturer who have manufactured and supplied atleast fifteen (15) nos. of single phase Surge Arrestors of 132 KV or above Voltage Class suitable for Air Insulated Substation/Switchyard which are in successful operation for minimum two (2) years:

For 132 kV or above class Surge Arrestors:

Sl. No.	Item Description	Details
1.	Name and Address of Manufacturer and Name of contact person with email ID, Telephone & Fax Nos.	
2	Location of manufacturer plant & its address, Telephone & Fax Nos.	
3	Name of the plant / project & its location for which the manufacturer has supplied the 132 KV Surge Arrestors	
2.	Client Name and its Address, including Tel. No. and Fax no.	
4.	Name and designation of the responsible person in Clients organisation.	
5	Name & locatin of the substation / switchyard	
6.	i)Contract No. & Date	
	ii)Brief scope of work	
	iii) Value of Order	
07	Scope of work for the aforesaid contract includes the following	
	(i) Manufactured	Yes/No
	(ii) Supplied	Yes/No
	iii)Type test	Yes/No

Signature of authorized signatory.....

08	i)No. of single phase surge Arrestors supplied	
	ii)Voltage Level (in KV)	
09	Date of Commissioning	
10	Date of commencement of successful Operation & No of years of service	
11	Whether single phase surge arrestors supplied which are in successful operation for at least two (2) years.	Yes / No
12.	Client(s) certificate(s) enclosed in support of stated experience above at Annexure.....to this Attachment-3K.(Use separate sheet for each experience/Contract)	YES* / NO*

Date:

(Signature).....

Place:

(Printed Name).....

(Designation).....

(Common Seal).....

Signature of authorized signatory.....

Sub : Sub-Qualifying Requirements for the Sub-Station Automation System & Protective Relays

- (i) In order to satisfy the requirement of Supplier experience as indicated in Technical Specifications, Clause No. 15.05.12 of Volume IV , **Part-A, Section-VI** , We hereby confirm that M/s, have offered the Substation Automation System with distributed architecture and is in successful operation in atleast one (1) Substation/Switchyard of not less than 220 KV class for minimum one (1) year . The details are given below :

Sl. No.	Item Description	Details
1.	Name and Address of Bidder /sub vendor and Name of contact person with email ID, Telephone & Fax Nos.	
2.	Client Name and its Address, including Tel. No. and Fax no.	
3	Name of the plant / project & its location for which the Bidder / Subvendor have supplied the Substation Automation System with distributed architecture and is in successful operation in atleast one (1) Substation/Switchyard of not less than 220 KV class	
4.	Name and designation of the responsible person in Clients organisation.	
5	Name & location of the substation / switchyard	
6.	i)Contract No. & Date	
	ii)Brief scope of work	
	iii) Value of Order	
07	Scope of work for the aforesaid contract includes the following for Bidder /sub vendor	
	(i) Manufactured	Yes/No
	(ii) Supplied	Yes/No
	iii)Type test	Yes/No

Signature of authorized signatory.....

	iv)Construction / Erection	Yes/No
	v)Testing	Yes/No
	vi)Commissioning	Yes/No
08	Details of reference system	
	i) Manufacturers of bay equipment controllers	
	ii) Type designation of BayControllers	
	(iii) HMI software provided	
	iv)Whether the above Substation Automation System with distributed Architecture	Yes / No
	v)voltage level of Substation/Switchyard (in KV	
	vi)Whether Air insulated Substation/Switchyard or not	Yes/No
09	Date of Commissioning	
10	Date of commencement of successful Operation & No of years of service	
11	Whether the Substation Automation System with distributed architecture and is in successful operation in atleast one (1) Substation/Switchyard of not less than 220 KV class for minimum one (1) year	Yes / No
12.	Client(s) certificate(s) enclosed in support of stated experience above at Annexure.....to this Attachment-3K.(Use separate sheet for each experience/Contract)	YES* / NO*

Date : (Signature).....

Place : (Printed Name).....

Signature of authorized signatory.....

(Designation).....

(Common seal).....

Note : Continuation sheets of like size and format may be used as per Sub-vendor's requirement and shall be annexed to this Attachment.

* Please Strike off whichever is not applicable.

Signature of authorized signatory.....

- (ii) **For GENERATOR PROTECTION RELAYS, THE BAY PROTECTION UNITS INCLUDING THE BUS BAR PROTECTION :** In order to satisfy the requirement of Supplier experience as indicated in Technical Specifications, Clause No. 15.05.12 of Volume IV , **Part-A, Section-VI** , We hereby confirm that M/s is a manufacturer who have manufactured and supplied the offered type of devices for respective equipment, which are in successful operation in a 100 MW or above unit / 220 KV class or above Substation/Switchyard for minimum one (1) year. The details are given below:

Sl. No.	Item Description	Details
1.	Name and Address of Bidder /sub vendor and Name of contact person with email ID, Telephone & Fax Nos.	
2.	Client Name and its Address, including Tel. No. and Fax no.	
3	Name of the plant / project & its location for which the Bidder / Subvendor have supplied GENERATOR PROTECTION RELAYS, THE BAY PROTECTION UNITS INCLUDING THE BUS BAR PROTECTION which are in successful operation in a 100 MW or above unit / 220 KV class or above Substation/Switchyard for minimum one (1) year	
4.	Name and designation of the responsible person in Clients organisation.	
5	Name & location of the substation / switchyard	
6.	i)Contract No. & Date	
	ii)Brief scope of work	
	iii) Value of Order	
07	Scope of work for the aforesaid contract includes the following for Bidder /sub vendor	
	(i) Manufactured	Yes/No
	(ii) Supplied	Yes/No
	iii)Type test	Yes/No
	iv)Constrction / Erection	Yes/No

Signature of authorized signatory.....

	v)Testing	Yes/No
	vi)Commissioning	Yes/No
08	Details of reference system :	
	i) No of Generator protection Relays supplied	
	ii) Capacity of generators (in MW)	
	iii)No. of Bay Protection Units supplied	
	iv)No. of Bus bar protection system supplied	
09	Date of Commissioning	
	i)Generator Protection Relays	
	ii)Bay protection unit	
	iii)Busbar protection system	
10	Date of commencement of successful Operation & No of years of service	
	i)Generator Protection Relays	
	ii)Bay protection unit	
	iii)Busbar protection system	
	iv)Whether the above are used with Substation Automation System with distributed Architecture.	Yes / No
	v)voltage level of Substation/Switchyard (in KV)	
	vi)Whether Air insulated Substation/Switchyard or not	Yes/No
11	Whether the GENERATOR PROTECTION RELAYS, THE BAY PROTECTION UNITS INCLUDING THE BUS BAR PROTECTION which are in successful operation in a 100 MW or above unit / 220 KV class or above Substation/Switchyard for minimum one (1) year	Yes / No
12.	Client(s) certificate(s) enclosed in support of stated experience above at Annexure.....to this Attachment-3K.(Use separate sheet for each experience/Contract)	YES* / NO*

Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(Common seal).....

Signature of authorized signatory.....

- iii) **ENERGY METERING AND ABT SYSTEM** : In order to satisfy the requirement of Supplier experience as indicated in Technical Specifications, Clause No. 15.05.12 of Volume IV , We hereby confirm that M/s is a manufacturer who have manufactured and supplied the offered type of devices for respective equipment, which are in successful operation in a 100 MW or above unit / 220 KV class or above Substation/Switchyard for minimum one (1) year .The details are given below:

Sl. No.	Item Description	Details
1.	Name and Address of Bidder /sub vendor and Name of contact person with email ID, Telephone & Fax Nos.	
2.	Client Name and its Address, including Tel. No. and Fax no.	
3	Name of the plant / project & its location for which the Bidder / Subvendor have supplied ENERGY METERING AND ABT SYSTEM which are in successful operation in a 100 MW or above unit / 220 KV class or above Substation/Switchyard for minimum one (1) year	
4.	Name and designation of the responsible person in Clients organisation.	
5	Name & location of the substation / switchyard	
6.	i)Contract No. & Date	
	ii)Brief scope of work	
	iii) Value of Order	
07	Scope of work for the aforesaid contract includes the following for Bidder /sub vendor	
	(i) Manufactured	Yes/No
	(ii) Supplied	Yes/No
	iii)Type test	Yes/No
	iv)Constrction / Erection	Yes/No
	v)Testing	Yes/No
	vi)Commissioning	Yes/No

Signature of authorized signatory.....

08	Details of reference system :	
	i) No. of Energy meters	
	ii) ABT Software detail	
	iii) Voltage Level of Substation/Switchyard (in KV)	
09	Date of Commissioning of Energy Management system	
10	Date of commencement of successful Operation & No of years of service	
11	Whether the GENERATOR PROTECTION RELAYS, THE BAY PROTECTION UNITS INCLUDING THE BUS BAR PROTECTION which are in successful operation in a 100 MW or above unit / 220 KV class or above Substation/Switchyard for minimum one (1) year	Yes / No
12.	Client(s) certificate(s) enclosed in support of stated experience above at Annexure.....to this Attachment-3K.(Use separate sheet for each experience/Contract)	YES* / NO*

Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(Common seal).....

Signature of authorized signatory.....

3.00.00 PROVENNESS DATA FOR SOLAR PV ROOFTOP

3.01.00 FOR SOLAR PV ROOFTOP EPC CONTRACTOR

(A) For Bidder or its Sub-vendor seeking qualifications as per clause 15.06.01 of volume-IV, Part-A, Section-VI of technical specification

We confirm that we/ our Sub vendor have designed, supplied, erected/ supervised erection and commissioned/ supervised commissioning of Solar Photo Voltaic (SPV) based grid connected power plant of one plant of 40 kWp or above.

We further confirm that reference plant of 40 kWp or above capacity has been in successful operation for at least six (6) months.

Details of SPV based grid connected power plant of installed capacity of 40 kWp or above as per following details: Installed capacity of Grid connected power plant in

Kwp -

Sl. No.	Item Description	Reference Plant 1 (40 kWp or above)
1.	Description of work	
2.	Name of Client with full address, Fax No. & Tel. No.	
3.	Name of the Power Plant with its location	
4.	Name and designation of the responsible person in client's organization	
5.	Contract No. and Date	
6.	Whether this is a SPV based grid connected Power Plant	YES*/NO*
7.	Capacity of the Plant	kWp

(f) Supervised Commissioning YES*/NO*

YES*/NO*

9. Date of Commissioning of the above Plant
10. Copies of authentic purchase orders Completion Certificate from client, Agreements in support of details/data of Sl. No. 1 to 9 enclosed as Annex.

Note: Continuation sheets of like size and format may be used and annexed to this Attachment if required.

(ii) Details of reference plant of 40 kWp or above capacity has been in successful operation for at least six (6) months as per following :

Sl. No.	Item Description	Reference Plant
1.0	Description of work	
2.0	Name of Client with full address, Fax No. & Tel. No.	
3.0	Name of the Power Plant with its location	
4.0	Name and designation of the responsible person in client's organization	
5.0	Contract No. and Date	
6.0	Whether this is a SPV based grid connected Power Plant	YES*/NO*

**GREAT NICOBAR ISLAND GAS ENGINE POWER
PROJECT (108 MW \pm 5 MW) EPC PACKAGE
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**ATTACHMENT - 3K
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7.0	Capacity of the Plant	kWp
8.0	Whether scope of works included	
	(a) Design	YES*/NO*
	(b) Supply	YES*/NO*
	(c) Erected	YES*/NO*
	(d) Supervised Erection	YES*/NO*
	(e) Commissioned	YES*/NO*
	(f) Supervised Commissioning	YES*/NO*
9.0	Date of Commissioning of the above Plant	
10.0	No. of months of successful operation of the above plant prior to the date of Techno- Commercial bid opening date.	
11.0	Completion Certificate from client, Copies of Authentic purchase orders, Agreements in support of data/details of Sl. No. 1 to 10 enclosed as Annex.	

Note: Continuation sheets of like size and format may be used and annexed to this Attachment if required.

2.02.0 FOR SOLAR PV MODULE OF APPROVED QR

(A) For bidder or its Sub-vendor seeking qualifications as per clause 15.06.02 of Volume-IV, Part-A, Section-VI of Technical specification

(I) LIST OF SOLAR PLANTS OF CUMULATIVE INSTALLED CAPACITY 1 MWp or above IN WHICH SOLAR PV MODULES HAVE BEEN MANUFACTURED AND SUPPLIED DURING ANY ONE FINANCIAL YEAR.

NAME OF BIDDER/ SUB-VENDOR -

SL. No.	FINANCIAL YEAR	PROJECT LOCATION , CAPACITY, NAME OF CLIENT	DATE OF AWARD	APPROX CONTRACT VALUE(Rs)	KWp / MWp of MODULES SUPPLIED DURING THE FINANCIAL YEAR
1.0					
2.0					

The Bidder or its Sub-vendor should enclose client certificate/and/or copy of Letter of Award in respect of above

**LIST OF SOLAR PLANTS IN SUCCESSFUL OPERATION FOR AT LEAST 6 MONTHS PRIOR TO TECHNO COMMERCIAL
BID OPENING IN WHICH SOLAR PV MODULES HAVE BEEN MANUFACTURED AND SUPPLIED OF 300 Wp or above
USING INDIGENOUS AND/ OR IMPORTED PV CELLS .**

NAME OF BIDDER/ SUB-VENDOR -

SL. No.	PROJECT LOCATION, CAPACITY, NAME OF CLIENT	DATE OF AWARD	APPROX CONTRACT VALUE	(>) 300 Wp MODULES SUPPLIED (Y/N)	DATE OF COMMISSIONING OF THE PROJECT
1.0					
2.0					

The Bidder or its Sub-vendor should enclose client certificate in respect of above.


The works referred to at clause (I) & (II) can be in same or different projects.


*** Strike off whichever is not applicable.**

**** Add more agencies if proposed.**





PART-A
VOLUME – V
GUARANTEES, PERFORMANCE TESTING
&
LIQUIDATED DAMAGES


CLAUSE NO.	GUARANTEES, PERFORMANCE TESTING & LIQUIDATED DAMAGES			
1.00.00	GUARANTEES			
1.01.00	GENERAL			
1.01.01	The Bidder shall guarantee that each Genset and other Equipment (for which performance guarantees are applicable) shall meet the various guarantees covered in Technical Specifications.			
1.01.02	Functional guarantees to be established by the Contractor are categorized as follows: Category-I Guarantees : Guarantees, which attract liquidated damages, as indicated under Clause No. 1.02.00 of this volume. Category-II Guarantees : Statutory Guarantees (Mandatory Guarantees), as indicated in Clause No. 1.03.00 of this volume. Category-III Guarantees : Demonstration parameters and capabilities, as indicated in Clause No. 1.04.00 of this volume.			
1.01.03	For Category I and II Guarantees, the Bidder shall furnish signed declarations in the manner prescribed in the relevant schedule of Forms and Procedures for these Guarantees. Demonstrable parameters for Category – III guarantees shall be indicated in an Annexure to be attached with the Guarantee Schedule.			
1.01.04	Category-I Performance Guarantee Tests for each Genset shall be conducted separately. Liquidated damages on account of short fall, if any, in "Guaranteed Plant Performance" shall be levied separately for each Genset as identified in clause 3.00.00, of this Volume.			
1.01.05	The quoted "Guaranteed Plant Performance", for each of the offered Genset, shall be deemed to include margins required for the error & inaccuracies of test instruments, method of test, human error and any other cause / uncertainties etc. The "Guaranteed Plant Performance" shall mean "Quoted Guaranteed Plant Performance" in the Guarantee Declaration Schedule without any adjustment for the tolerances.			
1.01.06	The Contractor shall conduct Performance Guarantee Tests for each Genset to establish that the Quoted Performance Guarantees are met.			
1.01.07	The Contractor shall also demonstrate all the specified Category – III guarantees as listed in this Volume during Acceptance Tests or Initial Operation.			
1.01.08	The term "Performance Guarantees" shall have the same meaning and shall be synonymous to "Functional Guarantees". Similarly, the term "Performance Tests" shall have the same meaning and shall be synonymous to "Guarantee Tests" or “Acceptance Tests”.			
1.01.09	The Functional Guarantee Tests shall be carried out on specified fuel, which shall be witnessed by owner/client. Liquidated Damages shall be applicable on shortfall, if any, upon testing.			
1.02.00	GUARANTEES ATTRACTING LIQUIDATED DAMAGES (CATEGORY-I)			
1.02.01	The bidder shall guarantee and establish following Category – I guarantees for each Genset: (i) Net Power Output of genset at Base/Full Load. (ii) Net Heat Rate at LHV basis at 100% of Genset base load.			
1.02.02	(a) ‘Measured Net Power Output’ shall be as per IEC and as defined in Clause 3.02.00 of Volume-IV, Part A, Section-VI. Measured Net Power Output shall be corrected for the reference conditions (Clause 3.01.00 of Volume-IV, Part-A, Section-VI).			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC NO: CS-6401-001-2	VOLUME-V GUARANTEES, PERFORMANCE TESTING & LIQUIDATED DAMAGES	Page 1 of 8


CLAUSE NO.	GUARANTEES, PERFORMANCE TESTING & LIQUIDATED DAMAGES																							
1.02.03	(b) Net Heat Rate as defined in Clause 3.03.00 of Volume-IV, Part-A, Section-VI, shall be computed for 100% Base Load with the Genset. These shall be corrected for the reference conditions (Clause 3.01.00 of Volume-IV, Part-A, Section-VI).																							
	(c) Further, no tolerance on the test results will be permitted for the instrument inaccuracy, human error in measurement, method of testing or for any other cause/ uncertainties etc.																							
	(d) In case of 2 types of engines offered. The methodology for deriving the net heat rate for the purpose of evaluation shall be as follows:																							
	<table><tr><th>Particulars</th><th>UOM</th><th>Type 1 Engine</th><th>Type 2 Engine</th></tr><tr><td>Number of engines</td><td>Nos.</td><td>N1 (Maximum 2)</td><td>N2</td></tr><tr><td>Individual Net Capacity</td><td>MW</td><td>p1</td><td>p2</td></tr><tr><td>Cumulative Net Capacity</td><td>MW</td><td>P1 = p1XN1 (Maximum 12±3 MW)</td><td>P2 = p2XN2</td></tr><tr><td>Quoted Heat Rate</td><td>kCal/kWh</td><td>HR1</td><td>HR2</td></tr></table>				Particulars	UOM	Type 1 Engine	Type 2 Engine	Number of engines	Nos.	N1 (Maximum 2)	N2	Individual Net Capacity	MW	p1	p2	Cumulative Net Capacity	MW	P1 = p1XN1 (Maximum 12±3 MW)	P2 = p2XN2	Quoted Heat Rate	kCal/kWh	HR1	HR2
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	$\text{Heat Rate} = ((P1 \times \text{HR1}) + (P2 \times \text{HR2})) / (P1+P2)$																							
Note: Correction shall be applicable as specified under Cl. No.3.04.00 of Vol IV, Part-A, Section-VI																								
In case the contractor is not able to demonstrate the above mentioned "Guaranteed Plant Performance" even after the modifications or replacements within ninety (90) days of notification by the Employer, the Employer at his discretion will take actions as follows:																								
<table><tr><td>a).</td><td>Net Output within (-) 2.5 % of the Guaranteed Net Power Output.</td><td>:</td><td>Accept the equipment/ system after levying Liquidated Damages for the shortfall from the quoted Guaranteed Net power Output, as per Clause No.3.00.00 of this Volume.</td></tr><tr><td>b).</td><td>Net Output beyond (-) 2.5 % of the Guaranteed Net Power Output.</td><td>:</td><td>At it's discretion may either accept the equipment/ system after levying Liquidated Damages for the shortfall from the quoted Guaranteed Net Power Output, as per Clause No. 3.00.00 of this Volume or reject the equipment/ system and recover the payment already made.</td></tr><tr><td>c).</td><td>Net Genset heat rate at 100% of Genset base load within (+) 2 % of the Guaranteed Net Genset Heat Rate at 100% of the base load.</td><td>:</td><td>Accept the equipment/ system after levying liquidated damages as defined in clause no. 3.00.00 of this volume for the shortfall, if any, from the declared guaranteed " Net Genset Heat Rate at 100% of the module base load.</td></tr><tr><td>d).</td><td>Net Genset heat rate at 100% of Genset base load beyond (+) 2 % of the Guaranteed Net Genset Heat Rate at 100% of the module base load.</td><td>:</td><td>At it's discretion may either accept the equipment/ system after levying Liquidated Damages for the shortfall from the quoted Guaranteed "Net Genset heat rate at 100% of Genset base load, as per Clause No.3.00.00 of this Volume or reject the equipment/ system and recover the payment already made.</td></tr></table>				a).	Net Output within (-) 2.5 % of the Guaranteed Net Power Output.	:	Accept the equipment/ system after levying Liquidated Damages for the shortfall from the quoted Guaranteed Net power Output, as per Clause No.3.00.00 of this Volume.	b).	Net Output beyond (-) 2.5 % of the Guaranteed Net Power Output.	:	At it's discretion may either accept the equipment/ system after levying Liquidated Damages for the shortfall from the quoted Guaranteed Net Power Output, as per Clause No. 3.00.00 of this Volume or reject the equipment/ system and recover the payment already made.	c).	Net Genset heat rate at 100% of Genset base load within (+) 2 % of the Guaranteed Net Genset Heat Rate at 100% of the base load.	:	Accept the equipment/ system after levying liquidated damages as defined in clause no. 3.00.00 of this volume for the shortfall, if any, from the declared guaranteed " Net Genset Heat Rate at 100% of the module base load.	d).	Net Genset heat rate at 100% of Genset base load beyond (+) 2 % of the Guaranteed Net Genset Heat Rate at 100% of the module base load.	:	At it's discretion may either accept the equipment/ system after levying Liquidated Damages for the shortfall from the quoted Guaranteed "Net Genset heat rate at 100% of Genset base load, as per Clause No.3.00.00 of this Volume or reject the equipment/ system and recover the payment already made.					
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GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC NO: CS-6401-001-2	VOLUME-V GUARANTEES, PERFORMANCE TESTING & LIQUIDATED DAMAGES	Page 2 of 8																				

CLAUSE NO.	GUARANTEES, PERFORMANCE TESTING & LIQUIDATED DAMAGES	<div>एनटीपीसी NTPC</div>													
1.03.00	STATUTORY GUARANTEES														
1.03.01	The Contractor shall establish following Statutory (Category II) Guarantees:														
	<div><div>(i).</div><div>NO_x emission level of less than 80 ppm (dry volume basis corresponding to 15% excess oxygen in Engine exhaust) while operating at 100%, 90%,80%,70%,60% & 50% of Base Load Output.</div></div>														
	<div><div>(ii).</div><div>Noise level (near field and far field) of Engines, Generators/Alternators and including all the auxiliaries and their system at 100% and 80% of the base load of Gensets as per the applicable Norms.</div></div>														
	<div><div>(iii)</div><div>Exit velocity of flue gases shall not be less than 20-25 m/s.</div></div>														
1.03.02	No tolerance or allowance on the test results will be permitted for the instrument error & inaccuracy, human error, the method of testing or for any other cause. If the contractor is not able to demonstrate the specified Guarantees, even after the modifications / replacements within ninety (90) days of the notification by the Owner/Client, the Owner/Client will reject the equipment/ system and recover the payment already made.														
1.04.00	DEMONSTRATION GUARANTEES														
1.04.01	'Demonstration Guarantees' or 'Category III Guarantees' are required to be demonstrated during 'Initial Operation' or 'Guarantee Test' of the respective Genset Unit, Equipment or System, as the case may be. No tolerance or allowance on the test results will be permitted for Instrument error or inaccuracy, human error, the method of testing or any other cause.														
1.04.02	<div>If it is found that a Demonstration Guarantee is not met, the Contractor shall carry out all necessary modifications and or/ replacements to make the equipment/ system comply with the guaranteed requirements at no extra cost to the Owner/Client and reconduct the Guarantee Test(s) with Owner's/Client's consent. If the Contractor is not able to demonstrate the Guarantees, even after the modifications / replacements with in ninety (90) days of the notification by the Employer, the Employer will:</div> <div><div>a.</div><div>Reject the equipment/ system/ plant and recover from the Contractor the payments already made.</div></div> <div>OR</div> <div><div>b.</div><div>Accept the equipment/ system/ plant after assessing the various parameters and capabilities and recover from the contract price an amount equivalent to the damages as determined by the Owner/Client. This amount shall be limited to the cost of replacement of equipment/system, replacement of which shall remove the deficiency so as to achieve the guarantee performance-</div></div>														
1.04.03	<div>Following Category III Guarantees shall be demonstrated:</div> <div>Plant Auxiliaries</div> <div>A) Tube settler/clarifier unit for PT plant shall be guaranteed for design effluent capacity meeting the effluent quality as mentioned below-</div> <table><tr><th>Sl. No.</th><th>Parameter</th><th>Outlet quality</th></tr><tr><td>i.</td><td>Organic Matter</td><td>Less than 0.05 mg/l (Organic matter shall be tested as per KmnO4 method)</td></tr><tr><td>ii.</td><td>Iron Content</td><td>Less than 0.3 mg/l</td></tr><tr><td>iii.</td><td>Turbidity</td><td>Less than 10 NTU</td></tr></table>			Sl. No.	Parameter	Outlet quality	i.	Organic Matter	Less than 0.05 mg/l (Organic matter shall be tested as per KmnO4 method)	ii.	Iron Content	Less than 0.3 mg/l	iii.	Turbidity	Less than 10 NTU
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GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC NO: CS-6401-001-2	VOLUME-V GUARANTEES, PERFORMANCE TESTING & LIQUIDATED DAMAGES	Page 3 of 8											

CLAUSE NO.	GUARANTEES, PERFORMANCE TESTING & LIQUIDATED DAMAGES																						
	<p>B) Lamella clarifier/ Tube settler for ETP shall be guaranteed for design effluent capacity meeting the guaranteed effluent quality (at the outlet) as mentioned: -</p> <table><tr><th>Sl. No.</th><th>Parameter</th><th>Outlet quality</th></tr><tr><td>(i)</td><td>Turbidity</td><td>10 NTU (max)</td></tr><tr><td>(ii)</td><td>Oil content</td><td>5 ppm (max)</td></tr></table> <p>C) DMF shall be designed such that Turbidity at outlet of each filter shall not exceed 2 NTU with inlet turbidity of upto 10 NTU.</p> <p>D) UF System</p> <ul style="list-style-type: none">i) Net permeate flow rate from each UF train shall be guaranteed for design capacity meeting the effluent quality.ii) SDI shall be limited to 3.iii) Life of Ultrafiltration membranes shall be guaranteed for minimum five (5) years.iv) For the guaranteed water quality and the permeate water capacity, UF plant shall give an undiminished recovery of 92% up to the end of 5 years of operation with replacement guarantee of membrane elements. <p>E) RO Plant</p> <ul style="list-style-type: none">i) Net permeate flow rate from each RO train shall be guaranteed for design capacity.ii) For the design water quality and the permeate water capacity guaranteed, undiminished overall recovery of RO plant shall not be less than 85% up to the end of 3 years of operation without any replacement of membrane elements.iii) Performance of CEB, CIP, RO Flushing System and Cleaning system shall be demonstrated.iv) Life of RO membranes shall be guaranteed for minimum three (3) years.v) For power guarantee purpose, RO High Pressure Pumps shall be designed at 20 deg C.vi) Design capacity of process equipment shall be guaranteed meeting the effluent capacity and the same shall not be less than specified capacity.vii) Permeate water quality at the outlet of RO plant shall be as follows: <table><tr><th>S.No.</th><th>Parameter</th><th>Unit</th><th>Permeate quality</th></tr><tr><td>1)</td><td>pH</td><td>-</td><td>7.5 to 8.5</td></tr><tr><td>2)</td><td>TDS</td><td>ppm</td><td>Less than 30 at 36 degC</td></tr></table> <p>(F) Potable water quality shall be as per latest IS standard.</p> <p>(G) Package Air Conditioning (PAC) Unit</p> <ul style="list-style-type: none">i) Specified temperature and humidity of conditioned space under worst ambient conditions. <p>(H) Compressed Air System</p> <p>Following shall be demonstrated at site:</p> <ul style="list-style-type: none">i) Parallel operation of air compressorsii) Dew point of air at the outlet of air-drying plants of instrument air compressor.iii) Pressure drop across the air drying plants of air compressors.iv) Vibration level of air compressors, blowers of air-drying plant.	Sl. No.	Parameter	Outlet quality	(i)	Turbidity	10 NTU (max)	(ii)	Oil content	5 ppm (max)	S.No.	Parameter	Unit	Permeate quality	1)	pH	-	7.5 to 8.5	2)	TDS	ppm	Less than 30 at 36 degC	
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GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC NO: CS-6401-001-2	VOLUME-V GUARANTEES, PERFORMANCE TESTING & LIQUIDATED DAMAGES	Page 4 of 8																			

CLAUSE NO.	GUARANTEES, PERFORMANCE TESTING & LIQUIDATED DAMAGES	
2.00.00	CONDUCTANCE OF PERFORMANCE / ACCEPTANCE TESTS	
2.01.00	General	
2.01.01	The responsibility of conducting the Performance Guarantee Test and establishing all the Guarantees and the Demonstration parameters / capabilities to the satisfaction of Employer, lies with the Contractor.	
2.01.02	Functional Guarantees/Demonstration shall be conducted at Site by the Contractor in presence of the Employer/Client. The contractor's Commissioning and start-up Engineer shall make the unit ready to conduct such test before start of initial operation. Such test shall be conducted along with the Initial Operations. (Refer Clause 2.10.00 of Volume V, Part A)	
2.01.03	Performance Guarantee/ Acceptance Tests shall be carried out in accordance with specified Performance Test Codes and the requirements stipulated in Technical Specifications.	
2.01.04	All special equipment, instruments, tools & tackles and other services required for the successful completion of the performance and guarantee tests as well as the demonstration tests shall be provided by the Contractor.	
2.01.05	Owner/Client shall attend the Factory Acceptance Tests of all the Engines and Alternators.	
2.02.00	Test Plan	
2.02.01	<p>The Contractor shall prepare a Test Plan for the specified Acceptance Tests. It shall include following:</p> <ol style="list-style-type: none"> Schedule of Activities for Preparation of Test, Pretest, Main Test, Evaluation and Preparation of Test Results. Responsibilities of Parties involved. Agreed and approved Test Procedure (duly signed by the authorized signatories of all the involved parties). Details of Test Apparatus and Instrumentation including calibration reports. Details of the Test Laboratories 	
2.02.02	The Contractor shall submit a consolidated Test Plan Document comprising the above to the Employer prior to start of Preparation for Performance Guarantee Test.	
2.03.00	Test Procedure	
2.03.01	The Bidder shall necessarily include in his proposal proposed Performance Guarantee Test Procedure and Sample Calculation for evaluation of Performance Guarantees (Genset Net Power Output, Genset Net Heat Rate, Statutory Guarantees and Demonstration Guarantees). The successful bidder procedure submitted with the offer shall be discussed and agreed with the Employer. A detailed final PG Test Procedure in accordance with the applicable test codes, specification requirements and agreements reached prior to award of the Contract shall be prepared during detailed engineering. Detailed Test Procedure shall be finalized prior to the commencement of commissioning activities.	
2.03.02	<p>Test Procedure Document shall necessarily include all the details indicated below in the same sequence of appearance:</p> <ol style="list-style-type: none"> Index Objective of Test Base Reference Conditions for the Guaranteed Performance 	
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC NO: CS-6401-001-2
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CLAUSE NO.	GUARANTEES, PERFORMANCE TESTING & LIQUIDATED DAMAGES			
	<ul style="list-style-type: none"> d. Guaranteed Performance, Statutory and Demonstration Guarantees e. Applicable Performance Test Codes clearly indicating their applicability f. Defined Test Boundaries g. Applicable heat balance diagrams (HBDs) and Correction curves h. PG Test Instrumentation Scheme i. Calibration requirements for all instrumentation to be used in Performance Guarantee test j. Measurement – frequency and method of recording the test readings k. Sample collection, handling and analysis method l. Method of Plant Operation during Performance Guarantee Test m. Preparation for Test – Equipment Inspection, Cleaning, Making the equipment ready for test (installation of temporary test instrumentation etc.). n. Allowable variation in test conditions with respect to Design Reference Conditions o. Number of Test Runs, Duration of each Run, Number of Readings etc. p. Test Start and Stop requirements q. Data Acceptance and Rejection Criteria r. Sample Calculation s. Properties of Air, Flue Gas, Water, and Constituent Properties of RLNG to be used in evaluation of Test Results t. Format of Test Report 			
2.04.00	Performance Test Codes			
2.04.01	Performance Guarantee/ Acceptance tests shall be conducted in accordance with the latest editions of relevant codes and standards for respective equipment/systems.			
2.05.00	Measuring Equipment			
2.05.01	For all measurements the Contractor shall provide the necessary instrumentation and test equipment. All the instruments will be calibrated by the Contractor before the tests in a reputed International Institute as approved by the Employer.			
2.05.02	The calibration certificates shall be submitted to the Employer fifteen days prior to the tests. Batch calibration is not acceptable. The calibration shall be valid for the period mentioned in the certificate. At the time of acceptance test, calibration of instruments should be valid as per calibration certificate.			
2.05.03	All costs associated with the supply, calibration, installation of test instruments and equipment shall be included in the bidder's scope.			
2.08.00	NOx Measurement and Evaluation			
2.08.01	Sampling, measurement and calculation method for NOx level in Engine exhaust shall be in accordance with US EPA Method 20. NOx measurement shall be established procedures such as the Non Dispersion Ultra Violet / Non Dispersive Infra Red Chemiluminescence type analyser. During measurement of NOx, oxygen content in the flue gas shall also be measured and the measured NOx value shall be corrected for 15 % excess oxygen in flue			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC NO: CS-6401-001-2	VOLUME-V GUARANTEES, PERFORMANCE TESTING & LIQUIDATED DAMAGES	Page 6 of 8


CLAUSE NO.	GUARANTEES, PERFORMANCE TESTING & LIQUIDATED DAMAGES																
	<p>gas. Measured NOx value shall be corrected first for Dry Volume basis and the value thus obtained shall be corrected for 15% excess oxygen in the flue gas.</p>																
2.08.02	Detailed Method of NOx measurement, calculation method, sample calculation and evaluation of result shall be included in Test Procedure Document.																
2.09.00	Test Reports																
2.09.01	The Contractor shall prepare a Test Report, and submit to the Employer within a time period agreed in Test Plan.																
2.09.02	<p>The Test Report shall include following information:</p> <ul style="list-style-type: none">a. Performance Guarantees and Design Reference Conditionsb. Description of Test Conductedc. Calculation for Test Condition and Correction for Design Reference Conditionsd. Records of Readings taken during the Teste. Calculation for Test Condition and Correction for Design Reference Conditionsf. Comparative Table of Corrected Test Results and Guarantee Performance Valuesg. Post Test uncertainty analysish. Discussion on the Test and its Resultsi. Conclusion																
2.10.00	<p>Performance Guarantee Test Schedule</p> <p>Performance Guarantee test shall be conducted along with the Initial Operations of initial 84 MW. The subsequent engines performance test which is to be installed in later years as per installation schedule shall be conducted after completion of respective engine and associated facilities</p>																
3.00.00	LIQUIDATED DAMAGES FOR SHORTFALL IN GUARANTEED PERFORMANCE																
3.01.00	<p>The Liquidated Damages (LD) for shortfall in guaranteed performance, if any, shall be levied as indicated below:</p> <table><tr><th>S.No.</th><th>Description</th><th>Value</th></tr><tr><td>1.</td><td>Net Heat Rate at 100% of Engine load.</td><td>₹ 354174 / (INR/kCal/kwh/MW) x Δ HRg x Y/1000</td></tr><tr><td>2.</td><td>Net Output of Genset INR/kW</td><td>₹ 319880 /(KW)x Δ Y</td></tr></table> <p>Where:</p> <table><tr><td>Δ HRg</td><td>Increase in Net Heat Rate at 100% of Net output of Engine from guaranteed value in Kcal/Kwh.</td></tr><tr><td>Y</td><td>Guaranteed Net Power output of each Engine quoted by bidder in KW at 100% load. The net Output shall be restricted by the upper limit of the range prescribed for the plant.</td></tr><tr><td>Δ Y</td><td>Decrease in Net Power Output of each Engine from guaranteed value in KW.</td></tr></table>	S.No.	Description	Value	1.	Net Heat Rate at 100% of Engine load.	₹ 354174 / (INR/kCal/kwh/MW) x Δ HRg x Y/1000	2.	Net Output of Genset INR/kW	₹ 319880 /(KW)x Δ Y	Δ HRg	Increase in Net Heat Rate at 100% of Net output of Engine from guaranteed value in Kcal/Kwh.	Y	Guaranteed Net Power output of each Engine quoted by bidder in KW at 100% load. The net Output shall be restricted by the upper limit of the range prescribed for the plant.	Δ Y	Decrease in Net Power Output of each Engine from guaranteed value in KW.	
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<div><div><div>GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE</div></div><div><div>TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC NO: CS-6401-001-2</div></div><div><div>VOLUME-V GUARANTEES, PERFORMANCE TESTING & LIQUIDATED DAMAGES</div></div><div><div>Page 7 of 8</div></div></div>																	


CLAUSE NO.	GUARANTEES, PERFORMANCE TESTING & LIQUIDATED DAMAGES	<div>एनटीपीसी</div> <div>NTPC</div>	
	<p>Note :</p> <p>(i) Contractor's aggregate liability to pay liquidated damages for failure to attain the functional guarantee shall not exceed twenty five percent (25%) of the Contract Price.</p> <p>(ii) Each of the liquidated damages specified above shall be independent and these liquidated damages shall be levied concurrently as applicable.</p>		
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART A BID DOC NO: CS-6401-001-2	<div>VOLUME-V</div> <div>GUARANTEES, PERFORMANCE TESTING & LIQUIDATED DAMAGES</div> <div>Page 8 of 8</div>





PART-A
VOLUME – VI
GENERAL TECHNICAL REQUIREMENTS (GTR)


CLAUSE NO.	<div style="text-align: center;">GENERAL TECHNICAL REQUIREMENTS</div> <div style="float: right;">  </div>			
1.00.00	INTRODUCTION This part covers technical requirements which will form an integral part of the Contract. The following provisions shall supplement all the detailed technical specifications and requirements brought out in Section-VI, the Technical Specification and the Technical Data Sheets.			
2.00.00	BRAND NAME Whenever a material or article is specified or described by the name of a particular brand, manufacturer or vendor, the specific item mentioned shall be understood to be indicative of the function and quality desired, and not restrictive; other manufacturer's products may be considered provided sufficient information is furnished to enable the Employer to determine that the products proposed are equivalent to those named.			
3.00.00	BASE OFFER & ALTERNATE PROPOSALS The Bidder's proposal shall be based upon the use of equipment and material complying fully with the requirements specified herein. It is recognized that the Contractor may have standardized on the use of certain components, materials, processes or procedures different than those specified herein. Alternate proposals offering similar equipment based on the manufacturer's standard practice will also be considered, provided the base offer is in line with technical specifications and such proposals meet the specified design standards and performance requirement and are acceptable to the Employer. Sufficient amount of information for justifying such proposals shall be furnished to Employer alongwith the bid to enable the Employer to determine the acceptability of these proposals.			
4.00.00	COMPLETENESS OF FACILITIES			
4.01.00	Bidders may note that this is an EPC Package contract. Plant shall be engineered and designed in accordance with the specification requirement. All engineering and associated services are required to ensure that a completely engineered plant shall be provided.			
4.02.00	All equipments furnished by the Contractor shall be complete in every respect, with all mountings, fittings, fixtures and standard accessories normally provided with such equipment and/or those needed for erection, completion and safe operation of the equipment and for the safety of the operating personnel, as required by applicable codes, though they may not have been specifically detailed in the respective specifications, unless included in the list of exclusions. All same standard components/ parts of same equipment provided shall be interchangeable with one another.			
4.03.00	For the C&I systems, the Contractor shall be required to provide regular information about future upgrades and migration paths to the Employer.			
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CLAUSE NO.	<div style="text-align: center;">GENERAL TECHNICAL REQUIREMENTS</div> <div style="float: right;">  </div>			
<div>5.00.00</div> <div>5.01.00</div>	<div>CODES & STANDARDS</div> <p>In addition to the codes and standards specifically mentioned in the relevant technical specifications for the equipment / plant / system, all equipment parts, systems and works covered under this specification shall comply with all currently applicable statutory regulations and safety codes of the Republic of India as well as of the locality where they will be installed, including the following :</p> <div> <ul style="list-style-type: none"> a) Indian Electricity Act b) Indian Electricity Rules c) Indian Explosives Act d) Indian Factories Act and State Factories Act e) Regulations of the Central Pollution Control Board, India f) Regulations of the Ministry of Environment & Forest (MoEF), Government of India h) Pollution Control Regulations of Department of Environment, Government of India i) State Pollution Control Board. (j.) Rules for Electrical installation by Tariff Advisory Committee (TAC). (k.) Building and other construction workers (Regulation of Employment and Conditions of services) Act, 1996 (l.) Building and other construction workers (Regulation of Employment and Conditions of services) Central Rules, 1998 (m.) Explosive Rules, 1983 (n.) Petroleum Act, 1984 (o.) Petroleum Rules, 1976, (p.) Gas Cylinder Rules, 1981 (q.) Static and Mobile Pressure Vessels (Unified) Rules, 1981 (r.) Workmen's Compensation Act, 1923 </div>			
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5.02.00	<p>(s.) Workmen's Compensation Rules, 1924</p> <p>(t.) NTPC Safety Rules for Construction and Erection</p> <p>(u.) NTPC Safety Policy</p> <p>(v.) Any other statutory codes / standards / regulations, as may be applicable.</p> <p>Unless covered otherwise in the specifications, the latest editions (as applicable as on date of bid opening), of the codes and standards given below shall also apply:</p> <p>a) Bureau of Indian standards (BIS)</p> <p>b) Japanese Industrial Standards (JIS)</p> <p>c) American National Standards Institute (ANSI)</p> <p>d) American Society of Testing and Materials (ASTM)</p> <p>e) American Society of Mechanical Engineers (ASME)</p> <p>f) American Petroleum Institute (API)</p> <p>g) Standards of the Hydraulic Institute, U.S.A.</p> <p>h) International Organization for Standardization (ISO)</p> <p>i) Tubular Exchanger Manufacturer's Association (TEMA)</p> <p>j) American Welding Society (AWS)</p> <p>k) National Electrical Manufacturers Association (NEMA)</p> <p>l) National Fire Protection Association (NFPA)</p> <p>m) International Electro-Technical Commission (IEC)/ European Norm (EN)</p> <p>n) Expansion Joint Manufacturers Association (EJMA)</p> <p>o) Heat Exchange Institute (HEI)</p> <p>p) IEEE standard</p> <p>q) JEC standard</p>			
	5.03.00	Other International/ National standards such as DIN, VDI, BS, GOST etc. shall also be accepted for only material codes and manufacturing standards, subject to the Employer's		
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	<p>approval, for which the Bidder shall furnish adequate information to justify that these standards are equivalent or superior to the standards mentioned above. In all such cases the Bidder shall furnish specifically the variations and deviations from the standards mentioned elsewhere in the specification together with the complete word to word translation of the standard that is normally not published in English.</p>			
5.04.00	Deleted			
5.05.00	<p>In the event of any conflict between the codes and standards referred to in the above clauses and the requirement of this specification, the requirement of Technical Specification shall govern.</p>			
5.06.00	Deleted			
5.07.00	<p>In case of any change in codes, standards & regulations between the date of bid opening and the date when vendors proceed with fabrication, the Employer shall have the option to incorporate the changed requirements or to retain the original standard. It shall be the responsibility of the Contractor to bring to the notice of the Employer such changes and advise Employer of the resulting effect.</p>			
5.08.00	<p>A detailed list of standards apart from those mentioned in the respective detailed specifications in other parts of Section-VI to which all equipment/systems/civil works should conform is indicated in this volume and elsewhere in the specification.</p>			
6.00.00	EQUIPMENT FUNCTIONAL GUARANTEE			
6.01.00	<p>The functional guarantees of the equipment under the scope of the Contract is given in Section-VI Part - A & B of Technical Specifications. These guarantees shall supplement the general functional guarantee provisions covered under Defect liabilities Section-IV, General Conditions of Contract.</p>			
6.02.00	<p>Liquidated damages for shortfall in meeting functional guarantee(s) during the performance and guarantee tests shall be assessed and recovered from the Contractor as specified elsewhere in this specification.</p>			
7.00.00	DESIGN OF FACILITIES/ MAINTENANCE & AVAILABILITY CONSIDERATIONS			
7.01.00	DESIGN OF FACILITIES			
	<p>All the design procedures, systems and components proposed shall have already been adequately developed and shall have demonstrated good reliability under similar conditions elsewhere.</p>			
	<p>The Contractor shall be responsible for the selection and design of appropriate equipments to provide the best co-ordinated performance of the entire system. The basic requirements are detailed out in various clauses of the Technical Specifications. The design of various components, assemblies and subassemblies shall be done so that it facilitates easy field</p>			
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7.02.00	<p>assembly and dismantling. All the rotating components shall be so selected that the natural frequency of the complete unit is not critical or close to the operating range of the unit.</p> <p>MAINTENANCE AND AVILABILITY CONSIDERATIONS</p> <p>Equipment/works offered shall be designed for high availability, low maintenance and ease of maintenance. The Bidder shall specifically state the design features incorporated to achieve high degree of reliability/ availability and ease of maintenance. The Bidder shall also furnish details of availability records in the reference plants stated in his experience list.</p> <p>Bidder shall state in his offer the various maintenance intervals, spare parts and man-hour requirement during such operation. The intervals for each type of maintenance namely inspections of the Engine, Generator/Alternator, inspection of the entire hot gas path and the minor and major overhauls shall be specified in terms of fired hours , clearly defining the spare parts and man-hour requirement for each stage.</p> <p>Lifting devices i.e. hoists and chain pulley jacks ,etc. shall be provided by the contractor for handling of any equipment or any of its part having weight in excess of 500 Kgs during erection and maintenance activities.</p> <p>Lifting devices like lifting tackles, slings, etc. to be connected to hook of the hoist / crane shall be provided by the contractor for lifting the equipment and accessories covered under the specification.</p>			
8.00.00	<p>DOCUMENTS, DATA AND DRAWINGS TO BE FURNISHED BY CONTRACTOR</p>			
8.01.00	<p>Bidders may note that this is an EPC Package contract. Each of the plant and equipment shall be fully integrated, engineered and designed to perform in accordance with the technical specification. All engineering and technical services required to ensure a completely engineered plant shall be provided in respect of mechanical, electrical and power systems, control & instrumentation, civil & structural works as per the scope.</p> <p>Each main and auxiliary equipment/item of the plant including instruments shall be assigned a unique tag number. The assignment of tag numbers shall be in accordance with KKS system. In all drawings/documents/data sheet etc. KKS tag number of the equipment/item/instrument etc. shall be indicated.</p> <p>The Contractor shall furnish engineering data /drawings in accordance with the schedule of information as specified in Technical Data Sheets and Technical Specification.</p> <p>A comprehensive engineering and quality coordination procedure shall be finalized with the successful bidder covering salient features as described in this section of specifications.</p>			
8.02.00	<p>The number of copies/prints/CD-ROMs/manuals to be furnished for various types of document is given in Annexure-VI to this volume of the Technical Specification.</p>			
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<p>8.03.00</p> <p>8.03.01</p>	<p>The documentation that shall be provided by the Contractor is indicated in the various sections of specification. This documentation shall include but not be limited to the following:</p> <p>A) BASIC ENGINEERING DOCUMENTATION</p> <p>Prior to commencement of the detailed engineering work, the Contractor shall furnish a Plant Definition Manual within three (3) weeks from the date of the Notification of Award. This manual shall contain the following as a minimum:</p> <ul style="list-style-type: none"> i) Description of all the mechanical, electrical, control & instrumentation & civil systems. ii) Technology scan for each system / sub-system & equipment. iii) Selection of appropriate technology / schemes for various systems/ subsystems including techno-economic studies between various options. iv) Deleted v) Sizing criteria of all the systems, sub-systems/ equipments/ structures/ equipment foundations alongwith all calculations justifying and identifying the sizing and the design margins. vi) Schemes and Process & Instrumentation diagrams for the various systems/ sub-system with functional write-ups. vii) Water Balance diagram, if applicable. viii) Operation Philosophy and the control philosophy of the Main Plant and Balance of Plant (BOP). ix) General Layout plan of the power station incorporating all facilities in Bidder's as well as those in the Employer's scope. This drawing shall also be furnished in the form of CD-ROMs. x) Basic layouts and cross sections of the Engine Hall & Utility Building, fuel oil area, transformer yard/switchyard and other areas included in the scope of the bidder. xi) Documentation in respect of Quality Assurance System as listed out elsewhere in this specification. <p>The successful bidder shall furnish within two (2) weeks from the date of Notification of Award, a list of contents of the Plant Definition Manual (PDMs) including techno-economic studies, which shall then be mutually discussed & finalised with the Employer.</p>			
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	<p>B) DETAILED ENGINEERING DOCUMENTS</p> <ul style="list-style-type: none"> i) General layout plan of the plant. ii) Layouts, general arrangements, elevations and cross-sections drawings for all the equipment and facilities of the plant. iii) Flow diagram, process and instrumentation diagrams along with write up and system description. iv) Start up curves for Engine-Generator/Alternator set. v) Piping isometric, composite layout and fabrication drawings. vi) Piping engineering diagrams, pipe and fittings schedules, valve schedules, hanger and support schedules, insulation schedules. vii) Technical data sheets for all bought out and manufactured items. Contractor shall use the Employer's specifications as a base for placement of orders on their sub vendors. viii) Detailed design calculations for components, system, piping etc., wherever applicable including sizing calculations for all auxiliaries like pumps, Air compressors etc. ix) Transient, hydraulic and thermal stress analysis of piping and system wherever applicable & input and output data alongwith stress analysis isometrics showing nodes. x) Thermal cycle information (heat balance diagrams and heat exchanger thermal calculations etc.). xi) Comprehensive list of all terminal points which interface with Employer's/Client's facilities, giving details of location, terminal pressure, temperature, fluid handled & end connection details etc. xii) Power supply single line diagram, block logics, control schematics, electrical schematics, etc. xiii) Protection system diagrams and relay settings. xiv) Cables schedules and interconnection diagrams. xv) Cable routing plan. xvi) Instrument schedule, measuring point list, I/O list, Interconnection & wiring diagram, functional write-ups, installation drawings for field mounted 			
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8.03.02	<p>instruments, logic diagrams, control schematics, wiring and tubing diagrams of panels and enclosures etc. Drawings for open loop and close loop controls (both hardware and software). Motor list and valve schedule including type of actuator etc.</p> <p>xvii) Alarm and annunciation/ Sequence of Event (SOE) list and alarms & trip set points.</p> <p>xviii) Sequence and protection interlock schemes.</p> <p>xix) Type test reports, insulation co-ordination study report and power system stability study report.</p> <p>xx) Control system configuration diagrams and card circuit diagrams and maintenance details.</p> <p>xxi) Detailed DDCMIS system manuals.</p> <p>xxii) Detailed flow chart for digital control system.</p> <p>xxiii) Mimic diagram layout, Assignment for other application engineering.</p> <p>xxiv) Civil and Structural works drawings and documents for all structures, facilities, architectural works, foundations underground and overground works and super-structural works as included in the scope of the bidder civil calculation sheets including structural analysis and design alongwith output results.</p> <p>However, for civil related documents/drawings, it will be limited to interface inputs as applicable and defined elsewhere in specification.</p> <p>xxv) Model study reports wherever applicable.</p> <p>xxvi) Functional & guarantee test procedures and test reports.</p> <p>xxvii) Documentation in respect of Quality Assurance System, and Documentation in respect of Commissioning, as listed out elsewhere in this specification.</p> <p>The Contractor while submitting the above documents/ drawings for approval/ reference as the case may be, shall mark on each copy of submission the reference letter alongwith the date vide which the submissions are made.</p> <p>INSTRUCTION MANUALS</p> <p>The Contractor shall submit to the Employer, draft Instruction Manuals for all the equipment covered under the Contract within nine (9) months from the date of his acceptance of the Letter of Award. The Instruction manuals shall contain full details required for erection,</p>		
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	<p>commissioning, operation and maintenance of each equipment. The manual shall be specifically compiled for this project. After finalisation and approval of the Employer the Instruction Manuals shall be submitted as indicated in Annexure-VI. The Contract shall not be considered to be completed for purposes of taking over until the final Instructions manuals have been supplied to the Employer. The Instruction Manuals shall comprise of the following.</p> <p>A) ERECTION MANUALS</p> <p>The erection manuals shall be submitted at least three (3) months prior to the commencement of erection activities of particular equipment/system. The erection manual should contain the following as a minimum.</p> <ol style="list-style-type: none"> a) Erection strategy. b) Sequence of erection. c) Erection instructions. d) Critical checks and permissible deviation/tolerances. e) List of tool, tackles, heavy equipments like cranes, dozers, etc. f) Bill of Materials g) Procedure for erection and General Safety procedures to followed during erection/installation. h) Procedure for initial checking after erection. i) Procedure for testing and acceptance norms. j) Procedure / Check list for pre-commissioning activities. k) Procedure / Check list for commissioning of the system. l) Safety precautions to be followed in electrical supply distribution during erection. <p>B) OPERATION & MAINTENANCE MANUALS</p> <ol style="list-style-type: none"> a) The manual shall be a two rim PVC bound stiff sided binder able to withstand constant usage or where a thicker type is required it shall have locking steel pins, the size of the manual shall not be larger than international size A3. The cover shall be printed with the Project Name, Services covered and Volume / Book number Each section of the manual shall be divided by a stiff divider of the same size as the holder. The dividers shall clearly state the section number and title. All written instructions within 		
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	<p>the manual not provided by the manufacturers shall be typewritten with a margin on the left hand side.</p> <p>b) The arrangement and contents of O & M manuals shall be as follows:</p> <p>i) <u>Chapter 1 - Plant Description</u> : To contain the following sections specific to the equipment/system supplied</p> <p>(a) Description of operating principle of equipment / system with schematic drawing / layouts.</p> <p>(b) Functional description of associated accessories / controls. Control interlock protection write up.</p> <p>(c) Integrated operation of the equipment alongwith the intended system. (This is to be given by the supplier of the Main equipment by taking into account the operating instruction given by the associated suppliers).</p> <p>(d) Exploded view of the main equipment, associated accessories and auxiliaries with description. Schematic drawing of the equipment alongwith its accessories and auxiliaries.</p> <p>(e) Design data against which the plant performance will be compared.</p> <p>(f) Master list of equipments, Technical specification of the equipment/ system and approved data sheets.</p> <p>(g) Identification system adopted for the various components, (it will be of a simple process linked tagging system).</p> <p>(h) Master list of drawings (as built drawing - Drawings to be enclosed in a separate volume).</p> <p>2) <u>Chapter 2.0 - Plant Operation</u>: To contain the following sections specific to the equipment supplied</p> <p>(a) Protection logics provided for the equipment alongwith brief philosophy behind the logic, Drawings etc.</p> <p>(b) Limiting values of all protection settings.</p> <p>(c) Various settings of annunciation/interlocks provided.</p> <p>(d) Startup and shut down procedure for equipment alongwith the associated systems in step mode.</p>			
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	<div><div><div><div>(e) Do's and Don'ts related to operation of the equipment.</div><div>(f) Safety precautions to be take during normal operation. Emergency instruction on total power failure condition/lubrication failure/any other conditions.</div><div>(g) Parameters to be monitored with normal value and limiting values.</div><div>(h) Equipment isolating procedures.</div><div>(i) Trouble shooting with causes and remedial measures.</div><div>(j) Routine testing procedure to ascertain healthiness of the safety devices alongwith schedule of testing.</div><div>(k) Routine Operational Checks, Recommended Logs and Records</div><div>(l) Change over schedule if more than one auxiliary for the same purpose is given.</div><div>(m) Preservation procedure on long shut down.</div><div>(n) System/plant commissioning procedure.</div></div><div><div>3) <u>Chapter 3.0 - Plant Maintenance-</u></div><div>To contain the following sections specific to the equipment supplied.</div><div><div><div>(a) Exploded view of each of the equipments. Drawings alongwith bill of materials including name, code no. & population.</div><div>(b) Exploded view of the spare parts and critical components with dimensional drawings (In case of Electronic cards, the circuit diagram to be given) and spare parts catalogue for each equipment.</div><div>(c) List of Special T/ P required for Overhauling /Trouble shooting including special testing equipment required for calibration etc.</div><div>(d) Stepwise dismantling and assembly procedure clearly specifying the tools to be used, checks to be made, records to be maintained etc. Clearance to be maintained etc.</div><div>(e) Preventive Maintenance schedules linked with running hours/calendar period alongwith checks to be carried out.</div><div>(f) Overhauling schedules linked with running hours/calendar period alongwith checks to be done.</div></div></div></div></div></div>			
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8.03.03.02	<div> <ul style="list-style-type: none"> i) Design and performance data. ii) Process & Instrumentation diagrams. iii) Single line diagrams. iv) Sequence & Protection Interlock Schemes. v) Alarm and trip values. vi) Performance Curves. vii) General layout plan and layout of Engine Hall & Utility Building. viii) Important Do's & Don't's <p>The plant handbook shall be submitted within ten (10) months from the date of award of contract. After the incorporation of Employer's comments, the final plant handbook complete in all respects shall be submitted three (3) months before start-up and commissioning activities.</p> </div>			
	<div> <p>PROJECT COMPLETION REPORT</p> <p>The Contractor shall submit a Project Completion Report at the time of handing over the plant.</p> <p>DRAWINGS</p> <p>a) i) All documents submitted by the Contractor for Employer's/Client's review shall be in electronic form (soft copies) along with the desired number of hard copies as per Annexure-VI. The soft copies shall be uploaded by the vendors in C-folders, a web-based system of NTPC ERP, for which a username and password will be allotted to the new vendor by NTPC.</p> <p>Similarly, the vendor can download the drawings/documents, approved/ commented by NTPC, through above site.</p> <p>The soft copies of identified drawings/documents shall be in pdf format, whereas the attachments/reply to the submitted document(s) can be in .doc, .xls, .pdf, .dwg or .std formats.</p> <p>ii) Final copies of the approved drawings along with requisite number of hard copies shall be submitted as per Annexure-VI.</p> <p>b) All documents/text information shall be in latest version of MS Office/MS Excel/PDF format as applicable.</p> </div>			
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	<p>c) All drawings submitted by the Contractor including those submitted at the time of bid shall be in sufficient detail indicating the type, size, arrangement, weight of each component for packing and shipment, the external connection, fixing arrangement required, the dimensions required for installation and interconnections with other equipments and materials, clearance and spaces required between various portions of equipment and any other information specifically requested in the drawing schedules.</p> <p>d) Each drawing submitted by the Contractor (including those of subvendors) shall bear a title block at the right hand bottom corner with clear mention of the name of the Employer, the system designation, the specifications title, the specification number, the name of the Project, drawing number and revisions. If standard catalogue pages are submitted the applicable items shall be indicated therein. All titles, notings, markings and writings on the drawing shall be in English. All the dimensions should be in metric units.</p> <p>e) The drawings submitted by the Contractor (or their sub-vendors) shall bear Employer's drawing number in addition to contractor's (their sub-vendor's) own drawing number. Employer's drawing numbering system shall be made available to the successful bidder so as to enable him to assign Employer's drawing numbers to the drawings to be submitted by him during the course of execution of the Contract.</p> <p>Similarly, all the drawings/ documents submitted by the Contractor during detailed engineering stage shall be marked "FOR APPROVAL" or "FOR INFORMATION".</p> <p>Further, space shall be identified on each drawing for Approval stamp and electronic signature.</p> <p>f) The furnishing of detailed engineering data and drawings by the Contractor shall be in accordance with the time schedule for the project. The review of these documents/ data/ drawings by the Employer will cover only general conformance of the data/ drawings/ documents to the specifications and contract, interfaces with the equipments provided by others and external connections & dimensions which might affect plant layout. The review by the Employer should not be construed to be a thorough review of all dimensions, quantities and details of the equipments, materials, any devices or items indicated or the accuracy of the information submitted. The review and/ or approval by the Employer/ Project Manager shall not relieve the Contractor of any of his responsibilities and liabilities under this contract.</p> <p>g) After the approval of the drawings, further work by the Contractor shall be in strict accordance with these approved drawings and no deviation shall be permitted without the written approval of the Employer.</p> <p>h) All manufacturing, fabrication and execution of work in connection with the equipment / system, prior to the approval of the drawings, shall be at the Contractor's risk. The Contractor is expected not to make any changes in the design of the equipment /system, once they are approved by the Employer. However, if some</p>			
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	<p>changes are necessitated in the design of the equipment/system at a later date, the Contractor may do so, but such changes shall promptly be brought to the notice of the Employer/Client indicating the reasons for the change and get the revised drawing approved again in strict conformance to the provisions of the Technical Specification.</p> <p>i) Drawings shall include all installations and detailed piping layout drawings. Layout drawings for all piping of 65 mm and larger diameter shall be submitted for review/ approval of Employer prior to erection. Small diameter pipes shall however be routed as per site conditions in consultation with site authority/ representative of Employer based on requirements of such piping indicated in approved/ finalised Flow Scheme/ Process & Instrumentation Diagrams and/or the requirements cropping up for draining & venting of larger diameter piping or otherwise after their erection as per actual physical condition for the entire scope of work of this package.</p> <p>Assessing & anticipating the requirement and supply of all piping and equipment shall be done by the contractor well in advance so as not to hinder the progress of piping & equipment erection, subsequent system charging and its effective draining & venting arrangement as per site suitability.</p> <p>j) As Built Drawings</p> <p>After final acceptance of individual equipment / system by the Employer, the Contractor will update all original drawings and documents for the equipment / system to “as built” conditions and submit no. of copies as per Annexure VI.</p> <p>k) Drawings must be checked by the Contractor in terms of its completeness, data adequacy and relevance with respect to Engineering schedule prior to submission to the Employer. In case drawings are found to be submitted without proper checking by the Contractor, the same shall not be reviewed and returned to the Contractor for re-submission. The contractor shall make a visit to site to see the existing facilities and understand the layout completely and collect all necessary data/ drawings at site which are needed as an input to the engineering. The contractor shall do the complete engineering including interfacing and integration of all his equipment, systems & facilities within his scope of work as well as interface engineering & integration of systems, facilities, equipment & works under Employer's scope and submit all necessary drawings/ documents for the same.</p> <p>l) The Contractor shall submit adequate prints of drawing / data / document for Employer's review and approval. The Employer shall review the drawings and return soft copy to the Contractor authorizing either to proceed with manufacture or fabrication, or marked to show changes desired. When changes are required, drawings shall be re-submitted promptly, with revisions clearly marked, for final review. Any delays arising out of the failure of the Contractor to submit/rectify and resubmit in time shall not be accepted as a reason for delay in the contract schedule.</p>			
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8.03.05	m) All engineering data submitted by the Contractor after final process including review and approval by the Project Manager/ Employer shall form part of the contract documents and the entire works covered under these specification shall be performed in strict conformity with technical specifications unless otherwise expressly requested by the Project Manager in writing.			
	e-Learning Package: e-learning packages shall be supplied for the equipment / system for the following Engine-Generator/Alternator set & auxiliaries along with associated electrical and C&I system.			
8.03.05.01	<p>These packages shall be installed on the Learning Management Server (LMS) of NTPC/Power Management Institute (PMI), NTPC located at Noida. The Engineer- In-Charge (EIC) for the e-learning modules shall be from PMI.</p> <p>1. The objective of the e-Learning package consisting of courses for erection, commissioning, operation and maintenance of equipment / system as specified above is to facilitate the employees to have first hand information / requirement with respect to above activities for the supplied equipment / system.</p> <p>2. The bidder shall submit e-learning courses each for erection, commissioning, operation and maintenance of each of the equipment / system supplied as above.</p> <p>a. The erection course(s) should include instructions on pre-checks, prerequisites, erection strategy, erection procedure etc.</p> <p>b. The commissioning course(s) should include instructions on pre-commissioning, commissioning, initial operation etc.</p> <p>c. The operation course(s) should include instructions on the permissive, interlocks, physical check ups, start up , shutdown and protections etc.</p> <p>d. The maintenance course(s) should include instructions on predictive, preventive, breakdown and overhauling.</p> <p>Depth of coverage of above courses shall be as specified for “Instruction Manuals” in above clauses. A literature on caution / safety while handling equipment / system for the above modules shall follow the description of the said equipment /system.</p> <p>3. The e-Learning packages on equipment / system shall be installed by the vendor and shall be successfully test run in the presence of EIC or representative before acceptance by NTPC. The vendor will also give the master copy in form of Flash Drive/CD/DVD. The respective module for erection & commissioning shall be delivered and successfully test run at least three months before the scheduled start of the corresponding activity at site. The respective module for operation & maintenance shall be delivered and successfully test run at least three months before scheduled first synchronization of first unit.</p> <p>4. e-Learning course broad requirements:</p> <p>a. The courses shall be web based and mobile based Application type. It shall run on all possible versions of web browser like Internet Explorer, Google Chrome, Firefox etc. on</p>			
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	<p>Laptop/Desktop and shall be Smartphone/Tablet/Mobile responsive. The Mobile responsive courses shall run on Android, Windows Mobile, Blackberry, iOS etc.</p> <p>b. The courses shall support liquid/fluid page layout so that the entire screen gets adjusted to PC, Laptop, Smartphone/Mobile, Tablet and any other display devices.</p> <p>c. Course content text shall be in English language and be associated with a voiceover in English language with Indian accent.</p> <p>d. Courses shall be SCORM (Sharable Content Object Reference Model) compliant, version 1.2 which is compatible with LMS at PMI.</p> <p>e. Each course shall have every physical and functional detail of the equipment / system supplied.</p> <p>f. Each of the e-Learning course shall be based on multiple web pages and mobile pages with multiple modules.</p> <p>g. There shall be option for self-assessment test after every course. In case the user doesn't opt for self assessment test the user shall be able to go to the next course. There shall be no restriction in no. of times for repeating the assessments. All correct answers along with the answers marked by the users shall be displayed at the end of test/quiz.</p> <p>h. If Java and Flash, as applicable are not available in the system to run the package, then there shall be a prompt message for updation of the same.</p> <p>i. Each course shall have a self-running interactive content with navigation buttons containing forward, backward, pause, bookmark and menu options in the course window.</p> <p>j. The course shall contain chapter titled 'Introduction/overview' that explains the purpose of the course.</p> <p>k. The course content shall contain descriptive text shall be factual, specific, terse, clearly worded, and simply illustrative, so that the user can understand it.</p> <p>l. The system shall provide the user with the ability to select the information with a Cursor.</p> <p>m. The course menu should contain table of content linked to concerned pages. The user shall be given the capability to access all of the functions available on the system through a menu system. This shall consist of active buttons, which shall control a hierarchy of pull down/pop up menus. Menu shall appear quickly and exist only while a selection is being made. The user shall be given the capability to position the cursor or pointer on the menu item and use pointer device such as mouse to activate the function.</p> <p>n. Every course shall contain the 3D design/drawing/exploded view/360⁰ turn around view of the equipment/system, textual description of the equipment/system and its functionality with video (as applicable), animation and audio.</p> <p>o. The users shall be able to control audio sound level associated with the courses.</p> <p>p. Drawings / text in the courses shall be scalable (Zoom In/ Out).</p> <p>q. The user shall have the capability to record a bookmark to mark displayed information for later recall, whenever he accesses the same course next time.</p>			
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	<p>Notes:</p> <p>1. e-learning Package of an equipment / system shall include e-learning courses for each of erection, commissioning, operation and maintenance of that equipment / system.</p> <p>2. e-learning courses on erection, commissioning, operation and maintenance of an equipment / system shall include e-learning lessons/chapters/modules (as required) for erection, commissioning, operation and maintenance respectively of that equipment / system.</p> <p>3. The vendor shall get the approval of one sample course from EIC before proceeding for further courses.</p>				
8.04.00	Not used				
8.05.00	Engineering Co-ordination Procedure				
8.05.01	<p>The following principal coordinators will be identified by respective organizations at time of award of contract:</p> <p>NTPC Engineering Coordinator (NTPC EC):</p> <p>Name : </p> <p>Designation : </p> <p>Address : </p> <p>a) Postal : </p> <p>b) Telegraphic / e-Mail : </p> <p>c) FAX : TELEPHONE : </p> <p>Contractor's/ Vendor's Engineering Coordinator (VENDOR EC):</p> <p>Name : </p> <p>Designation : </p> <p>Address : </p> <p>a) Postal : </p> <p>b) Telegraphic / e-Mail : </p>				
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	<p>c) FAX : TELEPHONE :</p>		
8.05.02	All engineering correspondence shall be in the name of above coordinators on behalf of the respective organizations.		
8.05.03	<p>Contractor's/Vendor's Drawing Submission and Approval Procedure:</p> <p>a) All data/information furnished by Vendor in the form of drawings/ documents/catalogues or in any other form for NTPC's information/ interface and or review and approval are referred by the general term "drawings".</p> <p>b) Not used</p> <p>c) All drawings (including those of sub-vendor's) shall bear at the right hand bottom corner the 'title plate' with all relevant information duly filled in. The Contractor shall furnish this format to his sub-vendor along with his purchase order for sub-vendor's compliance.</p> <p>d) Not used</p> <p>e) The contractor shall make a visit to site to see the existing facilities and understand the layout completely and collect all necessary data / drawings at site which are needed as an input to the engineering. The contractor shall do the complete engineering including interfacing and integration of all his equipment, systems & facilities within his scope of work as well as interface engineering & integration of systems, facilities, equipment & works under Employer's scope and submit all necessary drawings/ documents for the same.</p> <p>f) Drawings must be checked by the Contractor in terms of its completeness, data adequacy and relevance with respect to engineering schedule prior to submission to the Employer. In case drawings are found to be submitted without proper endorsement for checking by the Contractor, the same shall not be reviewed and returned to the Contractor for re-submission.</p> <p>g) The Contractor shall submit adequate prints of drawing / data / document for Employer's review and approval. The drawings submitted by the Contractor/vendor shall be reviewed by NTPC and their comments shall be forwarded within three (3) weeks of receipt of drawings. Upon review of each drawing, depending on the correctness and completeness of the drawing, the same will be categorized and approval accorded in one of the following categories :</p> <p>CATEGORY- I Approved</p> <p>CATEGORY- II Approved, subject to incorporation of comments/ modification as noted. Resubmit revised drawing incorporating the comments.</p>		
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<p>8.06.00</p> <p>8.06.01</p>	<p>CATEGORY –III Not approved. Resubmit revised drawings for approval after incorporating comments/ modification as noted.</p> <p>CATEGORY -IVFor information and records.</p> <p>h) Contractor shall resubmit the drawings approved under Category II, III & IVR within two (2) weeks of receipt of comments on the drawings, incorporating all comments. Every revision of the drawing shall bear a revision index wherein such revisions shall be highlighted in the form of description or marked up in the drawing identifying the same with relevant revision Number enclosed in a triangle (eg. 1, 2, 3 etc). Contractor shall not make any changes in the portions of the drawing other than those commented. If changes are required to be made in the portions already approved, the Contractor shall resubmit the drawing identifying the changes for Employer's review and approval. Drawings resubmitted shall show clearly the portions where the same are revised marking the relevant revision numbers and Employer shall review only such revised portion of documents.</p> <p>i) In case, the Contractor/ Vendor does not agree with any specific comment, he shall furnish the explanation for the same to NTPC for consideration. In all such cases the Contractor shall necessarily enclose explanations along with the revised drawing (taking care of balance comments) to avoid any delay and/or duplication in review work.</p> <p>j) It is responsibility of the Contractor/ Vendor to get all the drawings approved in the Category I & IV (as the case may be) and complete engineering activities within the agreed schedule. Any delay arising out of submission and modification of drawings shall not alter the contract completion schedule.</p> <p>k) If Contractor/ Vendor fails to resubmit the drawings as per the schedule, construction work at site will not be held up and work will be carried out on the basis of comments furnished on previous issues of the drawing.</p> <p>l) These comments will be taken care by the contractor while submitting the revised drawing.</p> <p>The contractor shall use a single transmittal for drawings. Submission. This shall include transmittal numbers and date, number of copies being sent, names of the agencies to whom copies being sent, drawing number and titles, remarks or special notes if any etc.</p> <p>ENGINEERING PROGRESS AND EXCEPTION REPORT</p> <p>The Contractor shall submit every month an Engineering progress and Exception Report giving the status of each engineering information including</p> <p>a) A list of drawings/engineering information which remains unapproved for more than three (3) weeks after the date of first submission</p>			
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	b)	Drawings which were not submitted as per agreed schedule.		
8.06.02	The draft format for this report shall be furnished to the Employer within two (2) weeks of the award of the contract, which shall then be discussed and finalised with the Employer.			
9.00.00	TECHNICAL CO-ORDINATION MEETING			
9.01.00	The Contractor shall be called upon to organise and attend monthly Design/ Technical Co-ordination Meetings (TCMs) with the Employer/Employer's representatives and other Contractors of the Employer during the period of contract. The Contractor shall attend such meetings at his own cost at NEW DELHI / NOIDA or at mutually agreed venue as and when required and fully co-operate with such persons and agencies involved during the discussions.			
9.02.00	The Contractor should note that Time is the essence of the contract. In order to expedite the early completion of engineering activities, the Contractor shall submit all drawings as per the agreed Engineering Information Submission Schedule. The drawings submitted by the Contractor will be reviewed by the Employer as far as practicable within three (3) weeks from the date of receipt of the drawing .The comments of the Employer shall then be discussed across the table during the above Technical Co-ordination Meeting (s) wherein best efforts shall be made by both sides to ensure the approval of the drawing.			
9.02.01	The Contractor shall ensure availability of the concerned experts / consultants/ personnel who are empowered to take necessary decisions during these meetings. The Contractor shall be equipped with necessary tools and facilities so that the drawings/documents can be resubmitted after incorporating necessary changes and approved during the meeting itself.			
9.02.02	Should any drawing remain unapproved for more than four (4) weeks after it's first submission, this shall be brought out in the monthly Engineering Progress and Exception Report with reasons thereof.			
9.03.00	Any delays arising out of failure by the Contractor to incorporate Employer's comments and resubmit the same during the TCM shall be considered as a default and in no case shall entitle the Contractor to alter the Contract completion date.			
10.00.00	DESIGN IMPROVEMENTS			
	The Employer or the Contractor may propose changes in the specification of the equipment or quality thereof and if the parties agree upon any such changes the specification shall be modified accordingly.			
	If any such agreed upon change is such that it affects the price and schedule of completion, the parties shall agree in writing as to the extent of any changing the price and/or schedule of completion before the Contractor proceeds with the change. Following such agreement, the provision thereof, shall be deemed to have been amended accordingly.			
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11.00.00	EQUIPMENT BASES A cast iron or welded steel base plate shall be provided for all rotating equipment which is to be installed on a concrete base, unless otherwise specifically agreed to by the Employer. Each base plate shall support the unit and its drive assembly, shall be of a neat design with pads for anchoring the units, shall have a raised lip all around, and shall have threaded drain connections.		
12.00.00	PROTECTIVE GUARDS Suitable guards shall be provided for protection of personnel on all exposed rotating and/or moving machine parts. All such guards shall be designed for easy installation and removal for maintenance purpose.		
13.00.00	LUBRICANTS, SERVO FLUIDS AND CHEMICALS		
13.01.00	All the first fill and one year's topping requirement of consumables such as greases, oils, lubricants, servo fluids / control fluids and essential chemicals etc. which will be required to put the equipment covered under the scope of specifications into successful commissioning/initial operation and to establish completion of facilities shall be supplied by the contractor. Suitable standard lubricants as available in India are desired. Efforts should be made to limit the variety of lubricants to minimum.		
13.02.00	<p>As far as possible lubricants marketed by the Indian Oil Corporation shall be used. The variety of lubricants shall be kept to a minimum possible.</p> <p>Detailed specifications for the lubricating oil, grease, gases, servo fluids, control fluids, chemicals etc. required for the complete plant covered herein shall be furnished. On completion of erection, a complete list of bearings/ equipment giving their location and identification marks shall be furnished to the Employer along with lubrication requirements.</p>		
14.00.00	LUBRICATION		
14.01.00	Equipment shall be lubricated by systems designed for continuous operation. Lubricant level indicators shall be furnished and marked to indicate proper levels under both standstill and operating conditions.		
15.00.00	MATERIAL OF CONSTRUCTION		
15.01.00	All materials used for the construction of the equipment shall be new and shall be in accordance with the requirements of this specification. Materials utilised for various components shall be those which have established themselves for use in such applications.		
16.00.00	RATING PLATES, NAME PLATES & LABELS		
16.01.00	Each main and auxiliary item of plant shall have permanently attached to it in a conspicuous position, a rating plate of non-corrosive material upon which shall be engraved		
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	<p>manufacturer's name, equipment, type or serial number together with details of the ratings, service conditions under which the item of plant in question has been designed to operate, and such diagram plates as may be required by the Employer.</p>			
16.02.00	<p>Each item of plant shall be provided with nameplate or label designating the service of the particular equipment. The inscriptions shall be approved by the Employer or as detailed in appropriate section of the technical specifications.</p>			
16.03.00	<p>Such nameplates or labels shall be of white nonhygroscopic material with engraved black lettering or alternately, in the case of indoor circuit breakers, starters, etc. of transparent plastic material with suitably coloured lettering engraved on the back.</p>			
16.04.00	<p>Items of plant such as valves, which are subject to handling, shall be provided with an engraved chromium plated nameplate or label with engraving filled with enamel. The name plates for valves shall be marked in accordance with MSS standard SP-25 and ANSI B 16.34 as a minimum.</p>			
16.05.00	<p>Hanger/ support numbers shall be marked on all pipe supports, anchors, hangers, snubbers and restraint assemblies. Each constant and variable spring support shall also have stamped upon it the designed hot and cold load which it is intended to support.</p>			
16.06.00	<p>Valves and strainers shall be identified by Employer's tag number of a metal tap permanently attached to non pressure parts such as the yoke by a stainless steel wire.</p>			
16.07.00	<p>Safety and relief valves shall be provided with the following:</p> <ul style="list-style-type: none"> a) Manufacturer's identification. b) Nominal inlet and outlet sizes in mm. c) Set pressure in Kg/cm² (abs). d) Blowdown and accumulation as percentage of set pressure. e) Certified capacity in kg of saturated steam per hour or in case of liquid certified capacity in litres of water per minute. 			
16.08.00	<p>All such plates, instruction plates, etc. shall be bilingual with Hindi inscription first, followed by English. Alternatively, two separate plates one with Hindi and the other with English inscriptions may be provided.</p>			
16.09.00	<p>All segregated phases of conductors or bus ducts, indoor or outdoor, shall be provided with coloured phase plates to clearly identify the phase of the system.</p>			
17.00.00	<p>TOOLS AND TACKLES</p>			
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	<p>The Contractor shall supply with the equipment one complete set of all special tools and tackles and other instruments required for the erection, assembly, disassembly and proper maintenance of the plant and equipment and systems (including software). These special tools will also include special material handling equipment, jigs and fixtures for maintenance and calibration / readjustment, checking and measurement aids etc.</p> <p>The price of each tool / tackle shall be deemed to have been included in the total bid price. These tools and tackles shall be separately packed and sent to site. The Contractor shall also ensure that these tools and tackles are not used by him during erection, commissioning and initial operation. For this period the Contractor should bring his own tools and tackles. All the tools and tackles shall be of reputed make acceptable to the Employer.</p>			
18.00.00	<p>COLOUR CODE FOR ALL EQUIPMENTS/ PIPINGS/ PIPE SERVICES</p> <p>All equipment/ piping/ pipe services are to be painted by the Contractor in accordance with Employer's standard colour coding scheme, which will be furnished to the Contractor during detailed engineering stage.</p>			
19.00.00	<p>PROTECTION AND PRESERVATIVE SHOP COATING</p>			
19.01.00	<p>PROTECTION</p> <p>All coated surfaces shall be protected against abrasion, impact, discoloration and any other damages. All exposed threaded portions shall be suitably protected with either metallic or a nonmetallic protection device. All ends of all valves and piping and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage. All primers/paints/coatings shall take into account the hot humid, corrosive & alkaline, subsoil or over ground environment as the case may be. The requirements for painting specification shall be complied with as detailed out in Part-A & B of the Technical Specification.</p>			
19.02.00	<p>PRESERVATIVE SHOP COATING</p> <p>All exposed metallic surfaces subject to corrosion shall be protected by shop application of suitable coatings. All surfaces which will not be easily accessible after the shop assembly, shall be treated beforehand and protected for the life of the equipment. All surfaces shall be thoroughly cleaned of all mill scales, oxides and other coatings and prepared in the shop. The surfaces that are to be finish-painted after installation or require corrosion protection until installation, shall be shop painted as per the requirements covered in the relevant part of the Technical Specification.</p> <p>Transformers and other electrical equipments, if included shall be shop finished with one or more coats of primer and two coats of high grade resistance enamel. The finished colors shall be as per manufacturer's standards, to be selected and specified by the Employer at a later date.</p>			
19.03.00	<p>Shop primer for all steel surfaces which will be exposed to operating temperature below 95 degrees Celsius shall be selected by the Contractor after obtaining specific approval of the</p>			
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	<p>Employer regarding the quality of primer proposed to be applied. Special high temperature primer shall be used on surfaces exposed to temperature higher than 95 degrees Celsius and such primer shall also be subject to the approval of the Employer.</p>		
19.04.00	<p>All other steel surfaces which are not to be painted shall be coated with suitable dust preventive compound subject to the approval of the Employer.</p>		
19.05.00	<p>All piping shall be cleaned after shop assembly by shot blasting or other means approved by the Employer. Lube oil piping or carbon steel shall be pickled.</p>		
19.06.00	<p>Painting for Civil structures and equipment/system covered under this package shall be done as specified under technical requirements on civil works in relevant part of this specifications or as per standard approved practices for the location and climate condition of the plant.</p>		
20.00.00	QUALITY ASSURANCE PROGRAMME		
20.01.00	<p>The Contractor shall adopt suitable quality assurance programme to ensure that equipment and services under the scope of contract whether manufactured or performed within the Contractor's works or at his sub-contractor's premises or at the Employer's site or at any other place of work are in accordance with the specifications. Such programmes shall be outlined by the Contractor and shall be finally accepted by the Employer or authorised representative after discussions before the award of the contract. Quality assurance programme shall generally cover the following:</p> <ol style="list-style-type: none"> a. Organization structure for the management and implementation of the proposed quality assurance programme b. Quality System Manual c. Design Control System d. Documentation Control System e. Qualification data for Bidder's key Personnel. f. Procedure for purchase of materials, parts, components and selection of sub-contractor's services including vendor analysis, source inspection, incoming raw-material inspection, verification of materials purchased etc. g. System for shop manufacturing and site erection control including process controls and fabrication and assembly controls. h. Control of non-conforming items and system for corrective actions and resolution of deviations. i. Inspection and test procedure both for manufacture and field activities. j. Control of calibration and testing of measuring testing equipments. k. System for Quality Audits. l. System for indication and appraisal of inspection status. m. System for authorizing release of manufactured product to the Employer. 		
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	<p>n. System for handling storage and delivery.</p> <p>o. System for maintenance of records, and</p> <p>p. Furnishing of Quality plans for manufacturing and field activities detailing out the specific quality control procedure adopted for controlling the quality characteristics relevant to each item of equipment / component as per formats enclosed as Annex-I & Annex-II respectively.</p>		
21.00.00	GENERAL REQUIREMENTS - QUALITY ASSURANCE		
21.01.00	<p>All materials, components and equipment covered under this specification shall be procured, manufactured, erected, commissioned and tested at all the stages, as per a comprehensive Quality Assurance Programme. An indicative programme of inspection/tests to be carried out by the contractor for some of the major items is given in the respective technical specification. This is, however, not intended to form a comprehensive programme as it is the contractor's responsibility to draw up and implement such programme duly approved by the Employer. The detailed Quality Plans for manufacturing and field activities shall be drawn up by the Bidder and will be submitted to Employer for approval. Schedule of finalisation of such quality plans will be finalised before award.</p>		
21.02.00	<p>Manufacturing Quality Plan will detail out for all the components and equipment, various tests/inspection, to be carried out as per the requirements of this specification and standards mentioned therein and quality practices and procedures followed by Contractor's/ Sub-contractor's/ sub-supplier's Quality Control Organisation, the relevant reference documents and standards, acceptance norms, inspection documents raised etc., during all stages of materials procurement, manufacture, assembly and final testing/performance testing. The Quality Plan shall be submitted on electronic media through C-folders, web based system of NTPC ERP for review and approval.</p>		
21.03.00	<p>Field Quality Plans will detail out for all the equipment, the quality practices and procedures etc. to be followed by the Contractor's site Quality Control Organisation, during various stages of site activities from receipt of materials/equipment at site.</p>		
21.04.00	<p>The Bidder shall also furnish copies of the reference documents/plant standards/acceptance norms/tests and inspection procedure etc., as referred in Quality Plans. These documents shall form a part of the contract. In these approved Quality Plans, Employer shall identify customer hold points (CHP), i.e. test/checks which shall be carried out in presence of the Employer's Project Manager or his authorised representative and beyond which the work will not proceed without consent of Employer/ Authorised representative in writing. All deviations to this specification, approved quality plans and applicable standards must be documented and referred to Employer along with technical justification for approval and disposition.</p>		
21.05.00	<p>The contractor shall submit to the Employer Field Welding Schedule for field welding activities. The field welding schedule shall be submitted to the Employer along with all supporting documents, like welding procedures, heat treatment procedures, NDT procedures etc. at least ninety days before schedule start of erection work at site.</p>		
21.06.00	<p>The contractor shall have suitable Field Quality Organisation with adequate manpower at Employer's site, to effectively implement the Field Quality Plan (FQP) and Field Quality</p>		
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	<p>Management System for site activities. The contractor shall submit the details of proposed FQA setup (organisational structure and manpower) for employer's approval. The FQA setup shall be in place at least one month before the start of site activities</p> <p>21.07.00 No material shall be despatched from the manufacturer's works before the same is accepted, subsequent to pre-despatch final inspection including verification of records of all previous tests/inspections by Employer's Project Manager/Authorised representative and duly authorised for despatch by issuance of Material Despatch Clearance Certificate (MDCC).</p> <p>21.08.00 All material used for equipment manufacture including casting and forging etc. shall be of tested quality as per relevant codes/standards. Details of results of the tests conducted to determine the mechanical properties, chemical analysis and details of heat treatment procedure recommended and actually followed shall be recorded on certificates and time temperature chart. Tests shall be carried out as per applicable material standards and/or agreed details/procedures.</p> <p>21.09.00 All welding and brazing shall be carried out as per procedure drawn and qualified in accordance with requirements of ASME Section IX/BS-4870 or other International equivalent standard acceptable to the Employer.</p> <p>21.10.00 All brazers, welders and welding operators employed on any part of the contract either in Contractor's/his sub-contractor's works or at site or elsewhere shall be qualified as per ASME Section-IX or BS-4871 or other equivalent International Standards acceptable to the Employer.</p> <p>21.11.00 Welding procedure qualification and Welder Qualification test results shall be furnished to the Employer for reference. However, where required by the Employer, tests shall be conducted in presence of Employer/ authorised representative.</p> <p>21.12.00 For all pressure parts and high pressure piping welding, any statutory requirements for the equipments/systems shall be complied with.</p> <p>21.13.00 Unless otherwise proven and specifically agreed with the Employer, welding of dissimilar materials and high alloy materials shall be carried out at shop only.</p> <p>21.14.00 No welding shall be carried out on cast iron components for repair.</p> <p>21.15.00 All the heat treatment results shall be recorded on time temperature charts and verified with recommended regimes.</p> <p>21.16.00 All non-destructive examination shall be performed in accordance with written procedures as per International Standards, The NDT operator shall be qualified as per SNT-TC-IA (of the American Society of non-destructive examination). NDT shall be recorded in a report which includes details of methods and equipment used, result/ evaluation, job data and identification of personnel employed and details of co-relation of the test report with the job.</p> <p>All bar stock / forging of diameter equal to or greater than 50 mm shall be ultrasonically tested. In general all plates equal to or greater than 40mm and for pressure parts, plate of</p>
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE	<div style="display: flex; justify-content: space-between;"> <div> TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2 </div> <div> VOLUME- VI GENERAL TECHNICAL REQUIREMENTS </div> <div> PAGE 27 OF 69 </div> </div>


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	thickness equal to or greater than 25mm shall be ultrasonically tested unless otherwise as specified in respective specification.			
21.17.00	The Contractor shall list out all major items/ equipment/ components to be manufactured in house as well as procured from sub-contractors (BOI). All the sub-contractor proposed by the Contractor for procurement of major bought out items including castings, forging, semi-finished and finished components/equipment etc., list of which shall be drawn up by the Contractor and finalised with the Employer, shall be subject to Employer's approval. The contractor's proposal shall include vendor's facilities established at the respective works, the process capability, process stabilization, QC systems followed, experience list, etc. along with his own technical evaluation for identified sub-contractors enclosed and shall be submitted to the Employer for approval within the period agreed at the time of pre-awards discussion and identified in "DR" category prior to any procurement. Such vendor approval shall not relieve the contractor from any obligation, duty or responsibility under the contract.			
21.17.00 a	An indicative list of sub-vendors accepted by NTPC in the past for Corporate Awarded similar packages is enclosed for reference purpose.			
21.18.00	For components/equipment procured by the contractors for the purpose of the contract, after obtaining the written approval of the Employer, the contractor's purchase specifications and inquiries shall call for quality plans to be submitted by the suppliers. The quality plans called for from the sub-contractor shall set out, during the various stages of manufacture and installation, the quality practices and procedures followed by the vendor's quality control organisation, the relevant reference documents/standards used, acceptance level, inspection of documentation raised, etc. Such quality plans of the successful vendors shall be finalised with the Employer and such approved Quality Plans shall form a part of the purchase order/contract between the Contractor and sub-contractor..			
21.19.00	Employer reserves the right to carry out quality audit and quality surveillance of the systems and procedures of the Contractor's or their subvendor's quality management and control activities. The contractor shall provide all necessary assistance to enable the Employer carry out such audit and surveillance.			
22.20.00	The contractor shall carry out an inspection and testing programme during manufacture in his work and that of his sub-contractor's and at site to ensure the mechanical accuracy of components, compliance with drawings, conformance to functional and performance requirements, identity and acceptability of all materials parts and equipment. He shall carry out all tests/inspection required to establish that the items/equipments conform to requirements of the specification and the relevant codes/standards specified in the specification, in addition to carrying out tests as per the approved quality plan.			
21.21.00	Quality audit, surveillance, approval of the results of the tests and inspection will not, however, prejudice the right of the Employer to reject the equipment if it does not comply with the specification when erected or does not give complete satisfaction in service and the above shall in no way limit the liabilities and responsibilities of the Contractor in ensuring complete conformance of the materials/equipment supplied to relevant specification, standard, data sheets, drawings, etc.			
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21.22.00	For all spares and replacement items, the quality requirements as agreed for the main equipment supply shall be applicable.			
21.23.00	Repair/ rectification procedures to be adopted to make the job acceptable shall be subject to the approval of the Employer/ authorised representative.			
21.24.00	Environmental Stress Screening Environmental stress screening test process / procedure for eliminating infant mortile components for DDCMIS / PLC based system & for other systems having substantial electronics components (as determined by employer) like Electronic transmitter, CCTV components, PA systems etc. shall be necessarily furnished for any sub vendors proposed for vendor assessment and approval for this contract. For other approved sub vendors of above mentioned systems, contractor shall furnish the test procedure for eliminating infant mortile components in case, if it is asked for by the employer before these items are offered for inspection / dispatched to site.			
21.25.00	Software Reliability/ Quality Certification Certification from OEM's authorized signatory that software offered with DDCMIS, PLC, CCTV, PA, Pyrometer, CEMS, AAQMS, EQMS, BHMS etc. declaring that the all the offered software(s) had gone through the established software quality test and offered software is not of β-version and offered software is also free from all known bugs as on date of approval of systems documents by NTPC as a part of quality documentation review and approval process during detail engineering.			
22.00.00	QUALITY ASSURANCE DOCUMENTATION PACKAGE			
22.01.00	The Contractor shall be required to submit the QA documentation in soft form as identified in respective quality plan with tick (✓) mark.			
22.02.00	Each QA documentation shall have a project specific cover sheet bearing name and identification number of equipment and including an index of its contents with page control on each document.			
22.03.00	The QA Documentation file shall be progressively completed by the Supplier's sub- supplier to allow regular reviews by all parties during the manufacturing			
22.04.00	The final Quality document will be compiled and issued at the final assembly place of equipment before dispatch.			
22.05.00	Typical content of QA documentation shall be as follows: a. Quality Plans b. Material mill test reports on components as specified by the specification and approved Quality Plans. c. Manufacturer / works test reports and results for testing required as per applicable codes and standard referred in the specification and approved quality plans. d. Nondestructive examination results including radiography interpretation reports.			
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	<p>e. Heat Treatment Certificates or Records (Time – Temperature Chart)</p> <p>f. All the accepted Non-conformance Reports (major or minor), Deviations including complete technical details, repair procedure etc.</p> <p>g. Customer Hold Points (CHP)/ Inspection reports duly signed by QA personnel of the Employer and Contractor for the agreed Customer Hold Points.</p> <p>h. Certificate of Conformance (COC), wherever required.</p> <p>i. MDCC</p>			
22.06.00	The contractor shall be required to submit two sets (CD), containing QA Documentation pertaining to field activities as per Approved Field Quality Plans and other agreed manuals/ procedures, prior to commissioning of individual system.			
22.07.00	Before dispatch / commissioning of any equipment, the Supplier shall make sure that the corresponding quality document or in the case of protracted phased deliveries, the applicable section of the quality document file is completed. The supplier will then notify the Inspector regarding the readiness of the quality document (or applicable section) for review.			
22.07.01	If the result of the review carried out by the Inspector is satisfactory, the Inspector shall stamp the quality document (or applicable section) for release.			
22.07.02	If the quality document is unsatisfactory, the Supplier shall endeavor to correct the incompleteness in order to finalize the quality document (or applicable section) within a period compatible with the requirements of contract documents. When it is done, the quality document (or applicable section) is stamped by the Inspector.			
22.07.03	If a decision is made to dispatch, whereas all outstanding actions cannot be readily cleared for the release of the quality document by that time. The supplier shall immediately, upon shipment of the equipment, send a copy of the quality document Review Status signed by the Supplier Representative to the Inspector and notify of the committed date for the completion of all outstanding actions & submission. The Inspector shall stamp the quality document for applicable section when it is effectively completed. The submission of QA documentation package shall not be later than 03 weeks after the dispatch of equipment.			
22.08.00	Transmission of QA Documentation			
22.08.01	On release of QA Documentation by Inspector, one set of quality document shall be forwarded to Corporate Quality Assurance Department and other set to respective Project Site of Employer.			
22.08.02	For the particular case of phased deliveries, the complete quality document to the Employer shall be issued not later than 3 weeks after the date of the last delivery of equipment.			
23.00.00	PROJECT MANAGER'S SUPERVISION			
23.01.00	To eliminate delays and avoid disputes and litigation, it is agreed between the parties to the Contract that all matters and questions shall be referred to the Project Manager of Employer and without prejudice to the provisions of 'Arbitration' clause in Section GCC, the Contractor shall proceed to comply with the Project Manager's decision.			
23.02.00	The work shall be performed under the supervision of the Project Manager. The scope of the duties of the Project Manager pursuant to the Contract will include but not be limited to the following:			
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	<div><div>a. Interpretation of all the terms and conditions of these documents and specifications;</div><div>b. Review and interpretation of all the Contractor's drawing, engineering data, etc;</div><div>c. Witness or authorize his representative to witness tests and trials either at the manufacturer's works or at site, or at any place where work is performed under the contract;</div><div>d. Inspect, accept or reject any equipment, material and work under the contract;</div><div>e. Issue certificate of acceptance and/or progressive payment and final payment certificates;</div><div>f. Review and suggest modifications and improvement in completion schedules from time to time, and</div><div>g. Supervise Quality Assurance Programme implementation at all stages of the works.</div></div>			
24.00.00	INSPECTION, TESTING AND INSPECTION CERTIFICATES			
25.01.00	The word 'Inspector' shall mean the Project Manager and/or his authorised representative and/or an outside inspection agency acting on behalf of the Employer to inspect and examine the materials and workmanship of the works during its manufacture or erection.			
24.02.00	The Project Manager or his duly authorised representative and/or an outside inspection agency acting on behalf of the Employer shall have access at all reasonable times to inspect and examine the materials and workmanship of the works during its manufacture or erection and if part of the works is being manufactured or assembled on other premises or works, the Contractor shall obtain for the Project Manager and for his duly authorised representative permission to inspect as if the works were manufactured or assembled on the Contractor's own premises or works.			
24.03.00	The Contractor shall give the Project Manager/Inspector ten (10) working days written notice of any material being ready for testing. Such tests shall be to the Contractor's account except for the expenses of the Inspector's. The Project Manager/Inspector, unless the witnessing of the tests is virtually waived and confirmed in writing, will attend such tests within ten (10) working days of the date on which the equipment is noticed as being ready for test/inspection failing which the contractor may proceed with test which shall be deemed to have been made in the inspector's presence and he shall forthwith forward to the inspector duly certified copies of test reports.			
24.04.00	The Project Manager or Inspector shall within ten (10) working days from the date of inspection as defined herein give notice in writing to the Contractor, or any objection to any drawings and all or any equipment and workmanship which is in his opinion not in accordance with the contract. The Contractor shall give due consideration to such objections and shall either make modifications that may be necessary to meet the said objections or shall inform in writing to the Project Manager/Inspector giving reasons therein, that no modifications are necessary to comply with the contract.			
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24.05.00	When the factory tests have been completed at the Contractor's or sub-contractor's works, the Project Manager /Inspector shall issue a certificate to this effect fifteen (15) days after completion of tests but if the tests are not witnessed by the Project Manager /Inspectors, the certificate shall be issued within fifteen (15) days of the receipt of the Contractor's test certificate by the Project Manager /Inspector. Project Manager /Inspector to issue such a certificate shall not prevent the Contractor from proceeding with the works. The completion of these tests or the issue of the certificates shall not bind the Employer to accept the equipment should it, on further tests after erection be found not to comply with the contract.												
24.06.00	In all cases where the contract provides for tests whether at the premises or works of the Contractor or any sub-contractor, the Contractor, except where otherwise specified shall provide free of charge such items as labour, material, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Project Manager /Inspector or his authorised representatives to carry out effectively such tests on the equipment in accordance with the Contractor and shall give facilities to the Project Manager/Inspector or to his authorised representative to accomplish testing.												
24.07.00	The inspection by Project Manager and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Contractor in respect of the agreed Quality Assurance Programme forming a part of the contract.												
24.08.00	To facilitate advance planning of inspection in addition to giving inspection notice as per Clause 23.03.00, the Contractor shall furnish quarterly inspection programme indicating schedule dates of inspection at Customer Hold Point and final inspection stages. Updated quarterly inspection plans will be made for each three consecutive months and shall be furnished before beginning of each calendar month.												
24.09.00	All inspection, measuring and test equipment used by contractor shall be calibrated periodically depending on its use and criticality of the test/measurement to be done. The Contractor shall maintain all the relevant records of periodic calibration and instrument identification, and shall produce the same for inspection by NTPC. Wherever asked specifically, the contractor shall re-calibrate the measuring/test equipment in the presence of Project Manager / Inspector.												
25.00.00	ASSOCIATED DOCUMENT FOR QUALITY ASSURANCE PROGRAMME <table><tr><td></td><td>Document</td><td>Format No.</td></tr><tr><td>i.</td><td>Manufacturing Quality Plan</td><td>QS-01-QAI-P-09/F1-R0 (Annexure – I)</td></tr><tr><td>ii.</td><td>Field Quality Plan</td><td>QS-01-QAI-P-09/F2-R0 (Annexure – II)</td></tr></table>					Document	Format No.	i.	Manufacturing Quality Plan	QS-01-QAI-P-09/F1-R0 (Annexure – I)	ii.	Field Quality Plan	QS-01-QAI-P-09/F2-R0 (Annexure – II)
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26.00.00	PRE-COMMISSIONING AND COMMISSIONING FACILITIES												
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26.01.00	<p>(a) As soon as the facilities or part thereof has been completed operationally and structurally and before start-up, each item of the equipment and systems forming part of facilities shall be thoroughly cleaned and then inspected jointly by the Employer and the Contractor for correctness of and completeness of facility or part thereof and acceptability for initial pre-commissioning tests, commissioning and start-up at Site. The list of pre-commissioning tests to be performed shall be as mutually agreed and included in the Contractor's quality assurance programme as well as those included in Section-VI and elsewhere in the Technical Specifications.</p> <p>(b) The Contractor's pre-commissioning/ commissioning/start-up engineers, specially identified as far as possible, shall be responsible for carrying out all the pre-commissioning tests at Site. On completion of inspection, checking and after the pre-commissioning tests are satisfactorily over, the commissioning of the complete facilities shall be commenced during which period the complete facilities, equipment shall be operated integral with sub-systems and supporting equipment as a complete plant.</p> <p>(c) All piping system shall be flushed, air blown as required and cleanliness demonstrated using acceptable industry standards. Procedures to accomplish this work shall be submitted for approval to the Employer six months prior to the respective implementations. The Employer will approve final verification of cleanliness.</p> <p>(d) The time consumed in the inspection and checking of the units shall be considered as a part of the erection and installation period.</p> <p>(e) The check outs during the pre-commissioning period should be programmed to follow the construction completion schedule. Each equipment/system, as it is completed in construction and turned over to Employer's commissioning (start-up) Engineer(s), should be checked out and cleaned. The checking and inspection of individual systems should then follow a prescribed schedule to be agreed by Employer.</p> <p>(f) The Contractor during initial operation and performance testing shall conduct vibration testing to determine the 'base line' of performance of all plant rotating equipment. These tests shall be conducted when the equipment is running at the base load, peak load as well as lowest sustained operating condition as far as practicable.</p>			
26.02.00	<p>Contractor shall furnish the commissioning organization chart for review & acceptance of employer at least eight (8) months prior to the schedule date of synchronization of 1st Genset. The chart should contain:</p> <p>(1.) Biodata including experience of the Commissioning Engineers.</p> <p>(2.) Role and responsibilities of the Commissioning Organisation members.</p>			
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	<p>c) For performance/ demonstration tests instrumentations, of accuracy class shall be as per specified test codes. The numbers and location of the instruments shall be as per the specified test codes. In addition the values of parameters shall be logged from the information system provided under Employer's Distributed Digital Control Monitoring and Information system. Test will be conducted at specified load points.</p> <p>d) Any special equipment, tools and tackles required for the successful completion of the Guarantee Tests shall be provided by the Contractor, free of cost.</p> <p>e) The Guarantee tests and specific tests to be conducted on equipment have been brought out in detail elsewhere in the specifications.</p> <p>f) All the defects including those pointed out by the owner/client during the initial trial operation period and while conducting Performance Guarantee tests, shall be rectified by the contractor by the end of the initial trial operation period.</p>			
27.00.00	<p>TAKING OVER</p> <p>Upon successful completion of Initial Operations and all the tests conducted to the Employer's satisfaction, the Employer shall issue to the Contractor a Taking over Certificate as a proof of the final acceptance of the equipment. Such certificate shall not unreasonably be withheld nor will the Employer delay the issuance thereof, on account of minor omissions or defects which do not affect the commercial operation and/or cause any serious risk to the equipment. Such certificate shall not relieve the Contractor of any of his obligations which otherwise survive, by the terms and conditions of the Contract after issuance of such certificate.</p>			
28.00.00	<p>TRAINING OF EMPLOYER'S PERSONNEL</p>			
28.01.00	<p>The scope of service under training of Employer's personnel shall include a training module covering the areas of Engineering, Operation & Maintenance.</p>			
28.03.00	<p>The scope of services under training shall also necessarily include training of Employer's Engineering personnel covering entire scope for the package. This shall cover all disciplines viz, Mechanical, Electrical, C&I , QA etc. and shall include all the related areas like Design familiarization, training on product design features and product design software of major equipment and systems, engineering, manufacturing, erection, commissioning, training on operating features of equipment, quality assurance and testing, plant visits and visits to manufacturer's works, exposure to various kinds of problems which may be encountered in fabrication, manufacturing erection, welding etc.</p>			
28.04.00	<p>Total duration of the training shall be of 5 (five) man months. The break-up of the training period shall be as following-</p> <p>i. 1 (One) Man month – At Engine manufacturers works/factory</p>			
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	<div>ii. 4 (four) Man months - Comprehensive training program consisting of classroom and plant visit of similar running plant for Employer's personnel for safe and efficient operation of the plant addressing the erection, commissioning, operation and maintenance aspects of the plant. Accommodation with lodging and boarding and local conveyance at the place of training shall be provided to the Employer's personnel free of cost. Cost of journey to and from the place of training shall be borne by the Employer.</div> <div>Detail of the training shall be finalized during detail engineering of the project.</div> <div>Note:</div> <div>1. For training purposes, one (1) man month implies 30 working days (excluding all intervening holidays) per person.</div> <div>2. The total man months in each area shall be divided into suitable number of modules which shall be discussed and finalized during post award stage.</div>			
29.00.00	<div>SAFETY ASPECTS DURING CONSTRUCTION AND ERECTION</div> <div>In addition to the requirements given in Erection Conditions of Contract (ECC) the following shall also cover:</div> <div><div>i) Working platforms should be fenced and shall have means of access.</div><div>ii) Ladders in accordance with Employer's safety rules for construction and erection shall be used. Rungs shall not be welded on columns. All the stairs shall be provided with handrails immediately after its erection.</div></div>			
30.00.00	<div>NOISE LEVEL</div> <div>The noise levels shall meet the MoEF&CC guidelines as enclosed at Annexure-IA of Volume IV, Part-A, Section-VI and requirements specified elsewhere.</div>			
31.00.00	<div>PACKAGING AND TRANSPORTATION</div>			
31.01.00	<div>All the equipment shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection.</div>			
31.02.00	<div>Bidder shall carry out detailed study regarding the transport facilities available at the project location including port handling facilities for safe transportation of various equipment and system to the project site.</div>			
31.03.00	<div>Before dispatching it shall be ensured that complete processing and manufacturing of the components is carried out at shop, only restricted by transport limitation, in order to ensure that site works like grinding, welding, cutting & preassembly to bare minimum. The</div>			
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	<p>Employer's Inspector shall have right to insist on completion of works in shops before dispatch of materials for transportation.</p>																	
31.04.00	<p>The Contractor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing.</p>																	
32.00.00	ELECTRICAL EQUIPMENTS/ENCLOSURES																	
32.01.00	<p>All electrical equipment and devices, including insulation, heating and ventilation devices shall be designed for ambient temperature and a maximum relative humidity as specified elsewhere in the specifications.</p>																	
33.00.00	INSTRUMENTATION AND CONTROL																	
	<p>All instrumentation and control systems/ equipment/ devices/ components, furnished under this contract shall be in accordance with the requirements stated herein, unless otherwise specified in the detailed specifications.</p>																	
33.01.00	<p>All instrument scales and charts shall be calibrated and printed in metric units and shall have linear graduation. The ranges shall be selected to have the normal reading at 75% of full scale.</p> <p>All scales and charts shall be calibrated and printed in Metric Units as follows:</p> <table><tr><td>1. Temperature</td><td>- Degree centigrade (deg C)</td></tr><tr><td>2. Pressure</td><td>- Kilograms per square centimetre (Kg/cm²). Pressure instrument shall have the unit suffixed with 'a' to indicate absolute pressure. If nothing is there, that will mean that the indicated pressure is gauge pressure.</td></tr><tr><td>3. Draught-</td><td>- Millimetres of water column (mm wc).</td></tr><tr><td>5. Flow (Gas)</td><td>- Tonnes/ hour</td></tr><tr><td>7. Flow (Liquid)</td><td>- Tonnes / hour</td></tr><tr><td>8. Flow base</td><td>- 760 mm Hg. 15 deg.C</td></tr><tr><td>9. Density</td><td>- Grams per cubic centimetre.</td></tr></table>				1. Temperature	- Degree centigrade (deg C)	2. Pressure	- Kilograms per square centimetre (Kg/cm ²). Pressure instrument shall have the unit suffixed with 'a' to indicate absolute pressure. If nothing is there, that will mean that the indicated pressure is gauge pressure.	3. Draught-	- Millimetres of water column (mm wc).	5. Flow (Gas)	- Tonnes/ hour	7. Flow (Liquid)	- Tonnes / hour	8. Flow base	- 760 mm Hg. 15 deg.C	9. Density	- Grams per cubic centimetre.
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8. Flow base	- 760 mm Hg. 15 deg.C																	
9. Density	- Grams per cubic centimetre.																	
33.02.00	<p>All instruments and control devices provided on panels shall be of miniaturized design, suitable for modular flush mounting on panels with front draw out facility and flexible plan-in connection at rear.</p>																	
33.03.00	<p>Deleted.</p>																	
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34.00.00	ELECTRICAL NOISE CONTROL <p>The equipment furnished by the Contractor shall incorporate necessary techniques to eliminate measurement and control problems caused by electrical noise. Areas in Contractor's equipment which are vulnerable to electrical noise shall be hardened to eliminate possible problems. Any additional equipment, services required for effectively eliminating the noise problems shall be included in the proposal. The equipment shall be protected against ESD as per IEC-61000-2. Radio Frequency interference (RFI) and Electro Magnetic Interference (EMI) protection against hardware damage and control system mal-operations/errors shall be provided for all systems as per EN-50082-2 (1995).</p>		
35.00.00	SURGE PROTECTION FOR SOLID STATE EQUIPMENT <p>All solid state systems /equipment shall be able to withstand the electrical noise and surge as encountered in actual service conditions and inherent in a power plant and shall meet the requirements of surge protection as defined in ANSI C37.90.1-1989 on its suitable equivalent class of IEC 254-4. Details of the features incorporated and relevant tests carried out. The test certificates etc. shall be submitted by the Bidder.</p>		
36.00.00	INSTRUMENT AIR SYSTEM <p>The instrument air supply system as supplied by the Bidder for various pneumatic control & instrumentation devices like pneumatic actuators, power cylinders, E/P converters, piping / tubing etc.</p> <p>Each pneumatic instrument shall have an individual air shut - off valve. The pressure regulating valve shall be equipped with an internal filter, a 50 mm pressure gauge and a built-in filter housing blow down valve.</p>		
37.00.00	TAPPING POINTS FOR MEASUREMENTS <p>Tapping points shall include probes, wherever applicable, for analytical measurements and sampling.</p> <p>For direct temperature measurement of all working media, one stub with internal threading of approved pattern shall be provided along with suitable plug and washer. The Contractor will be intimated about thread standard to be adopted.</p> <p>The following shall be provided on equipment by the Bidder. The standard which is to be adopted, will be intimated to the Contractor.</p> <ul style="list-style-type: none"> i) Temperature test pockets with stub and thermowell ii) Pressure test pockets 		
38.00.00	SYSTEM DOCUMENTATION		
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	<p>The Bidder shall provide drawings, system overview & description, hardware/ software details, technical literature, functional & hardware schemes, bill of material, parts list, interconnection diagrams, data sheets, erection/ installation/ commissioning procedures, instruction/ operating manuals, etc. for each of the C& I system / sub-systems/ equipment supplied under this package. The documentation shall include complete details of the C&I systems/ sub-systems/ equipment to enable review by Employer during detailed engineering stage and to provide information to plant personnel for operation & Maintenance (including quick diagnostics & trouble shooting) of these C&I systems/ sub-systems/ equipment at site. The minimum documentation requirements for C&I systems shall be as stipulated under C&I "Technical Data Sheets" Part of specifications. In addition to this, system documentation for DDCMIS shall include as a minimum to that specified elsewhere in the Technical Specification.</p> <p>The exact format, submission schedule and contents of various documents shall be as finalised during detailed engineering stage.</p>			
38.01.00	Bill of material (instrument list) for all C&I equipment/ devices shall be furnished by the bidder in standard formats as approved by the Employer.			
39.00.00	MAINTENANCE MANUALS OF ELECTRONIC MODULES			
	<p>The Contractor shall have to furnish two (2 nos.) sets of all maintenance manual of each and every electronic card/module as employed on the various systems and equipment including peripherals etc., offered by him. The Contractor will also have to furnish the data regarding the expected failure rate of various modules and other system components. Further, the contractor shall furnish a set of operating manuals which should include block diagrams, make, model/type, details wiring and external connection drawings etc as required to do the testing and maintenance of the electronic modules.</p>			
40.00.00	Make in India requirements <p>a) The bidder shall follow Indian laws, regulations and standards. There shall not be any restriction in terms of compliance to codes & standards of foreign origin only. The compliance to equivalent/better Indian as well as other codes & standards, wherever available, shall also be acceptable.</p> <p>b) The technologies / products offered shall be environmentally friendly, consuming less energy, and safe, energy efficient, durable and long lasting under the prescribed operational conditions.</p> <p>c) The bidder/its sub vendor/supplier shall ensure supply of spares, materials and technological support for the entire life of the project.</p> <p>d) The bidder shall list out the products and components producing Toxic E-waste and other waste as specified. It shall have an Extended Producers Responsibility (EPR) so that after the completion of the lifecycle, the materials are safely recycled/ disposed of</p>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 39 OF 69

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41.00.00	<p>by the contractor and for this, the bidder has to establish recycling/ disposal unit as specified.</p> <p>e) The equipment/ material sourced from foreign companies will be tested in accredited labs in India before acceptance wherever such facilities are available. The testing shall be carried out in accordance with MOP extant order/guidelines.</p> <p>f) The bidder shall have to furnish a certificate regarding cyber security/safety of the equipment/process to be supplied/services to be rendered as safe to connect.</p> <p>g) All applicable safety requirements shall be met. Regular safety audit shall be carried out by the manufacturer/ supplier.</p> <p>h) Wherever required, the foreign supplier shall establish fully functional service centers in India and shall keep spares/material locally for future needs of Employer.</p> <p>i) To protect the security, integrity and reliability of equipment in this package, it is essential to remove vulnerabilities arising out of the possibility of cyber-attack through malware/ Trojans etc. embedded in imported equipment. This requirement shall apply to any item imported for end use or to be used as a component, or as a part in manufacturing, assembling of any equipment or to be used in this package. Contractor shall comply all the requirements of Order No 25-11/6/2018-PG, dated 02/07/2020 (attached as Annexure-III), issued by Ministry of Power, Government of India and its subsequent amendments/revisions. Contractor shall furnish declaration of compliance of MOP order dated 02/07/2020 requirements with dispatch of equipment/ item. Further, Contractor shall furnish back up testing certificates, whenever Employer asks the same.</p> <p>j) All equipment/materials/parts/items required in this package which are domestically manufactured with sufficient domestic capacity as identified in Annexure-I of MOP order dated 16/11/2021 including its subsequent revisions (copy attached as Appendix-II and Appendix-III) shall necessarily be sourced from the class-I local suppliers only as per the extant provisions of the Public Procurement (Preference to Make in India) Orders issued by DPIIT and MoP.</p>		
	<p>Compliance of Environment Clearance Conditions:</p> <p>Bidder has to ensure the compliance of the following requirements during the contract period, in addition to the requirements mentioned elsewhere in the Technical Specifications:</p> <p>Waste Handling and Disposal:</p> <ol style="list-style-type: none"> 1. Disposal of hazardous waste material including batteries, pesticides, organochlorines etc. would not be allowed in GNI. 2. The waste generated during construction and operation period of the project shall be managed as per the prevailing regulations on management of solid waste, plastic waste, e- waste, bio-medical waste, C&D waste and hazardous wastes issued in 2016 by the Ministry. The waste shall be segregated and should be recycled/reused as per the regulatory provisions. No Municipal Landfills will 		
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	<p>be allowed in GNI. All rejects after the recycling/reuse of waste must be transported to mainland for its safe disposal.</p> <p>3. No Groundwater shall not be drawn during execution construction of the project before prior approval from CGWA.</p> <p>Noise Pollution and its Control Measures:</p> <ol style="list-style-type: none"> Persons exposed to high noise generating equipment shall use Personal Protective Equipment (PPE) like earplugs/earmuffs, etc. Periodical medical examination on hearing loss shall be carried out for all the workers and maintain audiometric record and for treatment of any hearing loss including rotating to non- noisy/less noisy areas. <p>Human Health Environment:</p> <ol style="list-style-type: none"> Bi-annual Health check-up of all the workers is to be conducted. The study shall take into account of chronic exposure to noise which may lead to adverse effects like increase in heart rate and blood pressure, hypertension and peripheral vasoconstriction and thus increased peripheral vascular resistance. Similarly, the study shall also assess the health impacts due to air polluting agents. Baseline health status within study area shall be assessed and report be prepared. Mitigation measures should be taken to address endemic diseases. <p>Risk Mitigation and Disaster Management</p> <ol style="list-style-type: none"> Ergonomic working conditions with First Aid and sanitation arrangements shall be made for the drivers and other contract workers during construction phase. Safety management plan based on Risk Assessment shall be prepared to limit risk exposure to the workers within the plant boundary. Regular mock drills for on-site emergency management plan and Integrated Emergency Response System shall be developed for all kind of possible disaster situations. <p>Human Health Issues</p> <ol style="list-style-type: none"> The workspace shall be maintained as per international standards for occupational health and safety with provision of fresh air respirators, blowers, and fans to prevent any accumulation and inhalation of undesirable levels of pollutants including VOCs. Workers shall be strictly enforced to wear personal protective equipments like dust masks, earmuffs or ear plugs, whenever and wherever necessary/required. Special Visco-elastic gloves will be used by labor exposed to hazards from vibration. <p>Safety at Workplace:</p> <ol style="list-style-type: none"> Safety training shall be given to all workers specific to their work area and every worker and employee will be engaged in fire hazard awareness training and mock drills which will be conducted regularly. All standard safety and occupational hazard measures shall be implemented and monitored by the Bidder's concerned officials to prevent the occurrence of untoward incidents/ accidents. Emergency preparedness plan based on the Hazard Identification and Risk Assessment (HIRA) and Disaster Management Plan shall be implemented. Occupational health surveillance of the workers shall be done on a regular basis. All the vehicles engaged for construction should have valid pollution check certificate as per the motor vehicle act. Further, any regulations related to vehicle emission issued by 			
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	<p>local government should also be adhered to. Proper maintenance of vehicles and construction equipment</p> <p>5. Adequate measures to be taken for Dust suppression during construction . 1 No. of Mobile water sprinklers including Mist canons shall be arranged by the bidder.</p>			
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	LIST OF CODES AND STANDARDS			
	Indian Standards	Title	International and Internationally recognised standards	
	IS:277	Galvanised steel sheets (plain or corrugated)		
	IS:655	Specification for metal air duct		
	IS:800	Code of practice for use of structural steel in general building construction	BS 449:1969 BS 5950 ASA A57, 1-1952	
	IS:807	Code of practice for design, manufacture, erection and testing (Structural portion) of cranes and hoists 6588 (Issued by Standards Association of Australia). DIN 120:1936 (Sheet 1) DIN 120:1936 (Sheet 2) 327 part-I, 1951 BS 466 part-II, 1960 BS 644:1960 BS 1757:1951 BS 2573:part-I:1960	Draft Revision of A.S. NO. CS.2 SAA Crane and Hoist code Doc:No. BU/4 Rev	
	IS:875	Code of practice for design loads (other than earthquake) for buildings and structures Leading standards (issued by Canadian Standard) DIN-1055-1955 (Issued by ASA)	National Building code of Canada (1953)-Part-IV Design section 4.1	
	IS:1239 Part-I	Mild steel tubes	(ISO/R 65-1957) (ISO/R-64-1958) (ISO/R-65-1958) (BS 1387 : 1957)	
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	<p>IS:1239 Part-II</p> <p>IS:2825</p> <p>IS:1520</p> <p>IS:1600</p> <p>IS:1601</p> <p>IS:1893</p> <p>IS1978-1971</p> <p>IS:2254-1970</p> <p>IS:2266</p> <p>IS:2312</p> <p>IS:2365</p> <p>IS:3346</p>	<p>Mild steel tubulars and other wrought steel pipe fittings</p> <p>Code for unfired vessels</p> <p>Horizontal centrifugal pumps for clear cold and fresh water</p> <p>Code for practice for performance of constant speed IC Engines for general purpose</p> <p>Specification for performance of constant speed IC Engines for general Purpose</p> <p>Criteria for earthquake resistant design of structures</p> <p>Line Pipe April 1969.</p> <p>Dimensions of vertical shaft motor for pumps</p> <p>Steel wire ropes for general engineering purposes</p> <p>Propellant type Ventilation fans</p> <p>Steel wire suspension ropes for lifts and hoists</p> <p>Method for the determination of thermal conductivity of thermal insulation materials (two slab guarded</p>	<p>BS 1387 : 1967 BS 1387 :1967 BS 1740 :1965</p> <p></p> <p></p> <p></p> <p></p> <p></p> <p>API Standards 5L</p> <p>IEC Pub 72-1 part I NEMA Pub MG 1 1954</p> <p>BS :302 : 1968</p> <p></p> <p>BS : 1957</p> <p>DIN 52612 (Deutscher Normenausschuss) ASTM C 163-1964 (American Society of Testing and</p>
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	<div style="text-align: center;"> VOLUME- VI GENERAL TECHNICAL REQUIREMENTS </div> <div style="text-align: right;"> PAGE 44 OF 69 </div>

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS		
	<div> <div>hot plate method)</div> <div>materials)</div> <div>ASTM C 167-1974</div> <div>ASTM C 177-1963</div> </div> <div> <div>IS:3354</div> <div>Outline dimensions for electric lifts.</div> </div> <div> <div>IS:3401</div> <div>Silica gel</div> </div> <div> <div>IS:3588</div> <div>Specification for electrical axial flow fans</div> </div> <div> <div>IS:3589</div> <div>Electrically welded steel pipes for water, gas and sewage (200mm to 2000 mm Nominal Diametre)</div> </div> <div> <div>IS:3677</div> <div>Unbonded rock and slag wool for thermal insulation</div> </div> <div> <div>IS:3815</div> <div>Point hook with shank for general engineering purposes</div> <div>BS 482 - 1968 Doc.:67/3 1284 (Revision of BS 2903) (Issued BS)</div> </div> <div> <div>IS:3895</div> <div>Specification for monocrystalline semiconductor rectifier cells and stacks</div> </div> <div> <div>IS:3963</div> <div>Roof extractor unit</div> </div> <div> <div>IS:3975</div> <div>Mild steel wires, strips and tapes for armouring cables</div> </div> <div> <div>IS:4503</div> <div>Shell and tube type heat Exchanger</div> </div> <div> <div>IS:4540</div> <div>Specification for monocrystalline rectifier assembly equipment</div> </div> <div> <div>IS:4671</div> <div>Expanded polystyrene for thermal insulation purpose</div> </div>		
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	IS:4736	Hot dip zinc coating on steel tubes		
	IS:4894	Centrifugal fans		
	IS:5456	Code of practice for testing of positive displacement type air compressors and exhauster (For Test Tolerance Only)		
	IS:5749	Forged ramshorn hooks	Entwurf DIN 15402 Blett 1 Entwurf DIN 15402 BS 3017-1958	
	IS:6392	Steel pipe flanges	BS 4504 : 1969	
	IS:6524 Part-I	Code of practice for design of tower cranes Static and rail mounted	BS 2799 : 1956	
	IS:7098	Cross linked Polyethylene insulated PVC sheathed cables	Standard No. 1 to IPCEA (USA) Pub. No. 5-66-524	
	IS:7373	Specification for wrought aluminium and aluminium sheet and strips		
	IS:7938	Air receivers for compressed air installation		
	ISO:1217	Displacement compressor-Acceptance test		
	ASHRAE-33 heating coils.	Methods of testing for rating of forced circulation air cooling and air		
	ASHRAE-52-76 matter.	Air cleaning device used in general ventilation for removing particle		
	ASHRAE-22-72	Method of testing for rating of water cooled refrigerant condensers.		
	ASHRAE 23-67 compressors.	Methods of testing for rating of positive displacement refrigerant		
	ARI-450-6	Standard for water cooled refrigerant condensers.		
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	<p>ARI-550 Standard for centrifugal water chilling packages.</p> <p>ARI-410 Standard for forced circulation air cooling and air heating coils</p> <p>ARI-430/435 Central station AHU/Application of Central Station AHU BS:848 Fans (Part-1,2)</p> <p>BS:400 Low carbon steel cylinders for the storage & transport of permanent gases.</p> <p>BS:401 Low carbon steel cylinders for the storage & transport of liquified gases.</p> <p>CTI Code Acceptance test code for Water Cooling Tower. ACT-105</p> <p>ANSI-31.5 Refrigerant piping</p> <p>ASME-PTC- Atmospheric Water Cooling Equipment 23-1958</p> <p>AMCA A-21C Test Code for air moving devices</p> <p>API:618 Reciprocating Compressor for general refinery services.</p> <p>HYDRAULIC INSTITUTE STANDARDS.</p> <p>HYDRANT SYSTEM MANUALS OF TAC.</p> <p>TAC MANUALS OF SPRAY SYSTEM</p> <p>NFPA USA/ NSC UK/ UL USA/ FM USA STANDARDS.</p> <p>INDIAN EXPLOSIVES ACT.</p> <p>INDIAN FACTORIES ACT.</p> <p>STANDARD OF TUBULAR EXCHANGER MANUFACTURER'S ASSOCIATION.</p> <p>CODE AND STANDARD FOR CIVIL WORKS</p> <p>Some of the applicable Standards, Codes and references are as follows:</p> <p>Excavation & Filling</p> <p>IS: 2720 (Part-II, IV TO VIII, XIV, XXI, XXIII, XXIV, XXVII TO XXIX, XL) Methods of test for soils-determination for water content etc.</p>			
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	<div> <p>IS: 4701 Code of practice for earth work on canals.</p> <p>IS: 9758 Guide lines for Dewatering during construction.</p> <p>IS: 10379 Code of practice for field control of moisture and compaction of soils for embankment and sub-grade.</p> </div> <div>Properties, Storage and Handling of Common Building Materials</div> <div> <p>IS: 269 Specification for ordinary Portland cement, 33 grade.</p> <p>IS: 383 Specification for coarse and fine aggregates from natural sources for concrete.</p> <p>IS: 432 Specification for mild steel and (Parts 1&2) medium tensile steel bars and hard-drawn steel wires for concrete reinforcement.</p> <p>IS: 455 Specification for Portland slag cement.</p> <p>IS: 702 Specification for Industrial bitumen.</p> <p>IS: 712 Specification for building limes.</p> <p>IS: 808 Rolled steel Beam channel and angle sections.</p> <p>IS: 1077 Specification for common burnt clay building bricks.</p> <p>IS: 1161 Specification of steel tubes for structural purposes.</p> <p>IS: 1363 Hexagon head Bolts, Screws and nuts of production grade C.</p> <p>IS: 1364 Hexagon head Bolts, Screws and Nuts of Production grade A & B.</p> <p>IS: 1367 Technical supply conditions for Threaded fasteners.</p> <p>IS: 1489 Specification for Portland-pozzolana cement:</p> <p>(Part-I) Fly ash based.</p> <p>(Part-II) Calcined clay based.</p> <p>IS: 1542 Specification for sand for plaster.</p> <p>IS: 1566 Specification for hard-drawn steel wire fabric for concrete reinforcement.</p> <p>IS: 1786 Specification for high strength deformed bars for concrete reinforcement.</p> <p>IS: 2062 Specification for steel for general structural purposes.</p> </div>		
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	<div> <div> IS: 2116 Specification for sand for masonry mortars. </div> <div> IS: 2386 Testing of aggregates for concrete. (Parts-I to VIII) </div> <div> IS: 3150 Hexagonal wire netting for general purpose. </div> <div> IS: 3495 Methods of tests of burnt clay building bricks. (Parts-I to IV) </div> <div> IS: 3812 Specification for fly ash, for use as pozzolana and admixture. </div> <div> IS: 4031 Methods of physical tests for hydraulic cement. </div> <div> IS: 4032 Methods of chemical analysis of hydraulic cement. </div> <div> IS: 4082 Recommendations on stacking and storage of construction materials at site. </div> <div> IS: 8112 Specification for 43 grade ordinary portland cement. </div> <div> IS: 8500 Medium and high strength structural steel. </div> <div> IS: 12269 53 grade ordinary portland cement. </div> <div> IS: 12894 Specification for Fly ash lime bricks. </div> <div> Cast-In-Situ Concrete and Allied Works </div> <div> IS: 280 Specification for mild steel wire for general engineering purposes. </div> <div> IS: 456 Code of practice for plain and reinforced concrete. </div> <div> IS: 457 Code of practice for general construction of plain & reinforced concrete for dams & other massive structures. </div> <div> IS: 516 Method of test for strength of concrete. </div> <div> IS: 650 Specification for standard sand for testing of cement. </div> <div> IS: 1199 Methods of sampling and analysis of concrete. </div> <div> IS: 1791 General requirements for batch type concrete mixers. </div> <div> IS: 1838 Specification for preformed fillers for expansion joints in concrete pavements and structures (non-extruding and resilient type). (Part-I) </div> </div>		
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IS: 2204	Code of practice for construction of reinforced concrete shell roof.
IS: 2210	Criteria for the design of reinforced concrete shell structures and folded plates.
IS: 2438	Specification for roller pan mixer.
IS: 2502	Code of practice for bending and fixing of bars for concrete reinforcement.
IS: 2505	General requirements for concrete vibrators, immersion type.
IS: 2506	General requirements for concrete vibrators, screed board type.
IS: 2514	Specification for concrete vibrating tables.
IS: 2645	Specification for Integral cement water proofing compounds.
IS: 2722	Specification for portable swing weigh batches for concrete. (single and double bucket type)
IS: 2750	Specification for Steel scaffolding.
IS: 2751	Code of practice for welding of mild steel plain and deformed bars for reinforced concrete construction.
IS: 3025	Methods of sampling and test waste water.
IS: 3366	Specification for Pan vibrators.
IS: 3370 (Part I to IV)	Code of practice for concrete structures for the storage of liquids.
IS: 3414	Code of practice for design and installation of joints in buildings.
IS: 3550	Methods of test for routine control for water used in industry.
IS: 3558 concrete.	Code of practice for use of immersion vibrators for consolidating
IS: 4014 (Parts I & II)	Code of practice for steel tubular scaffolding.
IS: 4326	Code of practice for earthquake resistant design and construction of buildings.


CLAUSE NO.	<div style="text-align: right;">  </div> GENERAL TECHNICAL REQUIREMENTS			
	<div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 4461</div> <div style="width: 85%;">Code of practice for joints in surface hydro-electric power stations.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 4656</div> <div style="width: 85%;">Specification for form vibrators for concrete.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 4925</div> <div style="width: 85%;">Specification for batching and mixing plant.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 4990</div> <div style="width: 85%;">Specification for plywood for concrete shuttering work.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 4995 (Parts I & II)</div> <div style="width: 85%;">Criteria for design of reinforced concrete bins for the storage of granular and powdery materials.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 5256</div> <div style="width: 85%;">Code or practice for sealing joints in concrete lining on canals.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 5525</div> <div style="width: 85%;">Recommendations for detailing of reinforcement in reinforced concrete work.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 5624</div> <div style="width: 85%;">Specification for foundation bolts.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 6461</div> <div style="width: 85%;">Glossary of terms relating to cement concrete.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 6494</div> <div style="width: 85%;">Code of practice for water proofing of underground water reservoirs and swimming pools.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 6509</div> <div style="width: 85%;">Code of practice for installation of joints in concrete pavements.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 7861</div> <div style="width: 85%;">Code of practice for extreme weather concreting. (Parts I & II)</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 9012</div> <div style="width: 85%;">Recommended practice for shot concreting.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 9103</div> <div style="width: 85%;">Specification for admixtures for concrete.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 9417</div> <div style="width: 85%;">Recommendations for welding cold worked steel bars for reinforced concrete construction.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 10262</div> <div style="width: 85%;">Recommended guidelines for concrete mix design.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 11384</div> <div style="width: 85%;">Code of practice for composite construction in structural steel and concrete.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 11504</div> <div style="width: 85%;">Criteria for structural design of reinforced concrete natural draught cooling towers.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 12118</div> <div style="width: 85%;">Specification for two-parts poly sulphide.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS: 12200</div> <div style="width: 85%;">Code of practice for provision of water stops at transverse contraction joints in masonry and concrete dams.</div> </div>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 51 OF 69


CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	<p>IS: 13311 Method of non-destructive testing of concrete.</p> <p>Part-1 Ultrasonic pulse velocity.</p> <p>Part-2 Rebound hammer.</p> <p>SP:23 Handbook of concrete mixes</p> <p>SP: 24 Explanatory Handbook on IS: 456-1978</p> <p>SP: 34 Handbook on concrete reinforcement and detailing.</p> <p>Precast Concrete Works</p> <p>SP: 7(PartVI/ National Building Code- Structural design of prefabrication and Sec.7) systems building.</p> <p>IS: 10297 Code of practice for design and construction of floors and roofs using precast reinforced/prestressed concrete ribbed or cored slab units.</p> <p>IS: 10505 Code of practice for construction of floors and roofs using pre-cast reinforced concrete units.</p> <p>Masonry and Allied Works</p> <p>IS: 1905 Code of Practice for Structural Safety of Buildings-Masonry walls.</p> <p>IS: 2212 Code of Practice for Brickwork.</p> <p>IS: 2250 Code of Practice for Preparation and use of Masonry Mortar.</p> <p>SP: 20 Explanatory hand book on masonry code.</p> <p>Sheeting Works</p> <p>IS:277 Galvanised steel sheets (plain or corrugated).</p> <p>IS: 459 Unreinforced corrugated and semi-corrugated asbestos cement sheets.</p> <p>IS: 513 Cold-rolled carbon steel sheets.</p> <p>IS: 730 Specification for fixing accessories for corrugated sheet roofing.</p> <p>IS: 1626 Specification for Asbestos cement building pipes and pipe fittings, gutters and gutter fittings and roofing fittings.</p> <p>IS: 2527 Code of practice for fixing rain water gutters and down pipe for roof drainage.</p>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 52 OF 69


CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			<div>एनडीपीसी NTPC</div>
	<div><div>IS: 3007Code of practice for laying of asbestos cement sheets.</div><div>IS: 5913Methods of test for asbestos cement products.</div><div>IS: 7178Technical supply conditions for tapping screw.</div><div>IS: 8183Bonded mineral wool.</div><div>IS: 8869Washers for corrugated sheet roofing.</div><div>IS: 12093Code of practice for laying and fixing of sloped roof covering using plain and corrugated galvanised steel sheets.</div><div>IS: 12866Plastic translucent sheets made from thermosetting polyster resin (glass fibre reinforced).</div><div>IS: 14246Specification for continuously pre-painted galvanised steel sheets and coils.</div><div>Fabrication and Erection of Structural Steel Work</div><div>IS: 2016Specification for plain washers.</div><div>IS: 814Specification for covered Electrodes for Metal Arc Welding for weld steel.</div><div>IS: 1852Specification for Rolling and Cutting Tolerances for Hot rolled steel products.</div><div>IS: 3502Specifications for chequered plate.</div><div>IS: 6911Specification for stainless steel plate, sheet and strip.</div><div>IS: 3757Specification for high strength structural bolts</div><div>IS: 6623Specification for high strength structural nuts.</div><div>IS: 6649High Tensile friction grip washers.</div><div>IS: 800Code of practice for use of structural steel in general building construction.</div><div>IS: 816Code of practice for use of Metal Arc Welding for General Construction.</div><div>IS: 4000Code of practice for assembly of structural joints using high tensile friction grip fasteners.</div></div>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 53 OF 69

CLAUSE NO.	<div style="text-align: center;">GENERAL TECHNICAL REQUIREMENTS</div> <div style="float: right;">  </div>			
	<div> <div>IS: 9595</div><div>Code of procedure of Manual Metal Arc Welding of Mild Steel.</div> <div>IS: 817</div><div>Code of practice for Training and Testing of Metal Arc Welders.</div> <div>IS: 1811</div><div>Qualifying tests for Metal Arc Welders (engaged in welding structures other than pipes).</div> <div>IS: 9178</div><div>Criteria for Design of steel bins for storage of Bulk Materials.</div> <div>IS: 9006</div><div>Recommended Practice for Welding of Clad Steel.</div> <div>IS: 7215</div><div>Tolerances for fabrication steel structures.</div> <div>IS: 12843</div><div>Tolerance for erection of structural steel.</div> <div>IS: 4353</div><div>Recommendations for submerged arc welding of mild steel and low alloy steels.</div> <div>SP: 6 (Part 1 to 7)</div><div>ISI Hand book for structural Engineers.</div> <div>IS: 1608</div><div>Method of Tensile Testing of Steel products other than sheets, strip, wire and tube.</div> <div>IS: 1599</div><div>Method of Bend Tests for Steel products other than sheet, strip, wire and tube</div> <div>IS : 228</div><div>Methods of chemical Analysis of pig iron, cast iron and plain carbon and low alloy steel.</div> <div>IS : 2595</div><div>Code of Practice for Radio graphic testing.</div> <div>IS : 1182</div><div>Recommended practice for Radiographic Examination of fusion welded butt joints in steel plates.</div> <div>IS : 3664</div><div>Code of practice for Ultra sonic Testing by pulse echo method.</div> <div>IS : 3613</div><div>Acceptance tests for wire flux combination for submerged Arc Welding.</div> <div>IS : 3658</div><div>Code of practice for Liquid penetrant Flaw Detection.</div> <div>IS : 5334</div><div>Code of practice for Magnetic Particle Flaw Detection of Welds.</div> </div>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 54 OF 69


CLAUSE NO.	<div style="text-align: center;">GENERAL TECHNICAL REQUIREMENTS</div> <div style="text-align: right;">  </div>			
	<p>Plastering and Allied Works</p> <p>IS : 1635 Code of practice for field slaking of Building lime and preparation of putty.</p> <p>IS : 1661 Application of cement and cement lime plaster finishes.</p> <p>IS : 2333 Plaster-of-paris.</p> <p>IS : 2402 Code of practice for external rendered finishes.</p> <p>IS : 2547 Gypsum building plaster.</p> <p>IS : 3150 Hexagonal wire netting for general purpose.</p> <p>Acid and Alkali Resistant Lining</p> <p>IS : 158 Ready mixed paint, brushing, bituminous, black, lead free, acid, alkali & heat resisting.</p> <p>IS : 412 Specification for expanded metal steel sheets for general purpose.</p> <p>IS : 4441 Code of practice for use of silicate type chemical resistant mortars.</p> <p>IS : 4443 Code of practice for use of resin type chemical resistant mortars.</p> <p>IS : 4456 Method of test for chemical resistant tiles. (Part I & II)</p> <p>IS : 4457 Specification for ceramic unglazed vitreous acid resistant tiles.</p> <p>IS : 4832 Specification for chemical resistant mortars.</p> <p style="padding-left: 100px;">Part I Silicate type</p> <p style="padding-left: 100px;">Part II Resin type</p> <p style="padding-left: 100px;">Part III Sulphur type</p> <p>IS : 4860 Specification for acid resistant bricks.</p> <p>IS : 9510 Specification for bitumasitc, Acid resisting grade.</p> <p>Water Supply, Drainage and Sanitation</p> <p>IS : 458 Specification for concrete pipes.</p>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 55 OF 69


CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	IS : 554	Dimensions for pipe threads, where pressure tight joints are made on thread.		
	IS : 651	Specification for salt glazed stoneware pipes.		
	IS : 774	Flushing cisterns for water closets and urinals.		
	IS : 775	Cast iron brackets and supports for wash basins and sinks.		
	IS : 778	Copper alloy gate, globe and check valves for water works purposes.		
	IS : 781	Cast copper alloy screw down bib taps and stop valves for water services.		
	IS : 782	Caulking lead.		
	IS : 783	Code of practice for laying of concrete pipes.		
	IS : 1172	Basic requirements for water supply, drainage and sanitation.		
	IS : 1230	Cast iron rain water pipes and fittings.		
	IS : 1239	Mild steel tubes, tubulars and other wrought steel fittings.		
	IS : 1536	Centrifugally cast (Spun) iron pressure pipes for water, gas and sewage.		
	IS : 1537	Vertically cast iron pressure pipes for water, gas and sewage.		
	IS : 1538	Cast iron fittings for pressure pipe for water, gas and sewage.		
	IS : 1703	Ball valves (horizontal plunger type) including float for water supply purposes.		
	IS : 1726	Cast iron manhole covers and frames.		
	IS : 1729	Sand cast iron spigot and socket, soil, water and ventilating pipes, fittings and accessories.		
	IS : 1742	Code of practice for building drainage.		
	IS : 1795	Pillar taps for water supply purposes.		
	IS : 1879	Malleable cast iron pipe fittings.		
	IS : 2064	Code of practice for selection, installation and maintenance of sanitary appliances.		
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 56 OF 69


CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			
	IS : 2065	Code of practice for water supply in building.		
	IS : 2326	Automatic flushing cisterns for urinals.		
	IS : 2470 (Part-I & II)	Code of practice for installation of septic tanks.		
	IS : 2501	Copper tubes for general engineering purposes.		
	IS : 2548	Plastic seat and cover for water-closets.		
	IS : 2556 (Part 1 to 15)	Vitreous sanitary appliances (vitreous china).		
	IS : 2963	Non-ferrous waste fittings for wash basins and sinks.		
	IS : 3114	Code of practice for laying of cast iron pipes.		
	IS : 3311	Waste plug and its accessories for sinks and wash basins.		
	IS : 3438	Silvered glass mirrors for general purposes.		
	IS : 3486	Cast iron spigot and socket drain pipes.		
	IS : 3589	Electrically welded steel pipes for water, gas and sewage (200mm to 2000mm nominal diameter).		
	IS : 3989	Centrifugally cast (Spun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.		
	IS : 4111 (Part I to IV)	Code of practice for ancillary structure in sewerage system.		
	IS : 4127	Code of practice for laying of glazed stone-ware pipes.		
	IS : 4764	Tolerance limits for sewage effluents discharged into inland-surface waters.		
	IS : 4827	Electro plated coating of nickel and chromium on copper and copper alloys.		
	IS : 5329	Code of practice for sanitary pipe work above ground for buildings.		
	IS : 5382	Rubber sealing rings for gas mains, water mains and sewers.		
	IS : 5822	Code of practice for laying of welded steel pipes for water supply.		
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 57 OF 69


CLAUSE NO.	<div style="float: right;">  </div> GENERAL TECHNICAL REQUIREMENTS			
	<div> <p>IS : 5961 Cast iron grating for drainage purpose.</p> <p>IS : 7740 Code of practice for road gullies.</p> <p>IS : 8931 Cast copper alloy fancy bib taps and stop valves for water services.</p> <p>IS : 8934 Cast copper alloy fancy pillar taps for water services.</p> <p>IS : 9762 Polyethylene floats for ball valves.</p> <p>IS : 10446 Glossary of terms for water supply and sanitation.</p> <p>IS : 10592 Industrial emergency showers, eye and face fountains and combination units.</p> <p>IS : 12592 Specification for precast concrete manhole covers and frames.</p> <p>IS : 12701 Rotational moulded polyethylene water storage tanks.</p> <p>SP: 35 Hand book on water supply and drainage.</p> <p style="padding-left: 40px;">-Manual on Sewerage and sewage treatment (Published by CPH & EEO) As updated.</p> <p>Doors, Windows and Allied Works</p> <p>IS : 204 Tower Bolts</p> <p>Part-I Ferrous metals.</p> <p>Part-II Nonferrous metals.</p> <p>IS : 208 Door Handles.</p> <p>IS : 281 Mild steel sliding door bolts for use with padlocks.</p> <p>IS : 362 Parliament Hinges.</p> <p>IS : 420 Specification for putty, for use on metal frames.</p> <p>IS : 1003 Specification for timber panelled and glazed shutters-</p> <p>Part-I door (Part-I) shutters.</p> <p>IS : 1038 Steel doors, windows and ventilators.</p> <p>IS : 1081 Code of practice for fixing and glazing of metal (steel and aluminium) doors, windows and ventilators.</p> </div>			
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CLAUSE NO.	<div style="float: right;">एनटीपीसी NTPC</div> GENERAL TECHNICAL REQUIREMENTS			
	<div> <p>IS : 1341 Steel butt hinges.</p> <p>IS : 1361 Steel windows for industrial buildings.</p> <p>IS : 1823 Floor door stoppers.</p> <p>IS : 1868 Anodic coatings on Aluminium and its alloys.</p> <p>IS : 2202 (Part-II) Specification for wooden flush door shutters (solid core type); particle board face panels and hard board face panels</p> <p>IS:2209 Mortice locks (vertical type).</p> <p>IS:2553 Safety glass</p> <p>IS:2835 Flat transparent sheet glass.</p> <p>IS:3548 Code of practice for glazing in buildings.</p> <p>IS:3564 Door closers (Hydraulically regulated).</p> <p>IS : 3614 Fire check doors; plate, metal covered and rolling type.</p> <p>IS:4351 Steel door frames.</p> <p>IS:5187 Flush bolts.</p> <p>IS:5437 Wired and figured glass</p> <p>IS:6248 Metal rolling shutters and rolling grills.</p> <p>IS:6315 Floor springs (hydraulically regulated) for heavy doors.</p> <p>IS:7196 Hold fasts.</p> <p>IS:7452 Hot rolled steel sections for doors, windows and ventilators.</p> <p>IS:10019 Mild steel stays and fasteners.</p> <p>IS:10451 Steel sliding shutters (top hung type).</p> <p>IS:10521 Collapsible gates.</p> <p>Roof Water Proofing and Allied Works</p> <p>IS:1203 Methods of testing tar and bitumen.</p> </div>			
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	<div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:1322</div> <div style="width: 85%;">Specification for bitumen felts for water proofing and damp proofing.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:1346</div> <div style="width: 85%;">Code of practice for water proofing of roofs with bitumen felts.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:1580</div> <div style="width: 85%;">Specification for bituminous compound for water proofing and caulking purposes.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:3067</div> <div style="width: 85%;">Code of practice for general design details and preparatory work for damp proofing and water proofing of buildings.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:3384</div> <div style="width: 85%;">Specification for bitumen primer for use in water proofing and damp proofing.</div> </div> <div style="margin-top: 10px;">Floor Finishes and Allied Works</div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:1237</div> <div style="width: 85%;">Specification for cement concrete flooring tiles.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:1443</div> <div style="width: 85%;">Code of practice for laying and finishing of cement concrete flooring tiles.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:2114</div> <div style="width: 85%;">Code of practice for laying in-situ terrazzo floor finish.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:2571</div> <div style="width: 85%;">Code of practice for laying in-situ cement concrete flooring.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:3462</div> <div style="width: 85%;">Specification for unbacked flexible PVC flooring.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:4971</div> <div style="width: 85%;">Recommendations for selection of industrial floor finishes.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:5318</div> <div style="width: 85%;">Code of practice for laying of flexible PVC sheet and tile flooring.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:8042</div> <div style="width: 85%;">Specification for white portland cement.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:13801</div> <div style="width: 85%;">Specification for chequered cement concrete flooring tiles.</div> </div> <div style="margin-top: 10px;">Painting and Allied Works</div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:162</div> <div style="width: 85%;">Specification for fire resisting silicate type, brushing, for use on wood, colour as required.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:1477</div> <div style="width: 85%;">Code of practice for painting of ferrous metals in buildings.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">Part-I</div> <div style="width: 85%;">Pretreatment.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">Part-II</div> <div style="width: 85%;">Painting.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:1650</div> <div style="width: 85%;">Specification for colours for building and decorative finishes.</div> </div>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 60 OF 69


CLAUSE NO.	<div style="text-align: right;">  </div> GENERAL TECHNICAL REQUIREMENTS			
	<div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:2074</div> <div style="width: 85%;">Specification for red oxide-zinc chrome, priming, ready mixed paint air drying.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:2338</div> <div style="width: 85%;">Code of practice for finishing of wood and wood based materials.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">Part-I</div> <div style="width: 85%;">Operations and workmanship</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">Part-II</div> <div style="width: 85%;">Schedules</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:2395</div> <div style="width: 85%;">Code of practice for painting concrete, masonry and plaster surfaces.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">Part-I</div> <div style="width: 85%;">Operations and workmanship.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">Part-II</div> <div style="width: 85%;">Schedule.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:2524</div> <div style="width: 85%;">Code of practice for painting of nonferrous metals in buildings.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">Part-I</div> <div style="width: 85%;">Pretreatment.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">Part-II</div> <div style="width: 85%;">Painting.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:2932</div> <div style="width: 85%;">Specification of synthetic enamel paint, exterior, under-coating and finishing.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:2933</div> <div style="width: 85%;">Specification enamel paint, under coating and finishing.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:4759</div> <div style="width: 85%;">Code of practice for hot dip zinc coating on structural steel and other allied products.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:5410</div> <div style="width: 85%;">Specification for cement paint</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:5411 (Part-I)</div> <div style="width: 85%;">Specification for plastic emulsion paint-for exterior use</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:6278</div> <div style="width: 85%;">Code of practices for white washing and colour washing.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:10403</div> <div style="width: 85%;">Glossary of terms relating to building finishes.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">Piling and Foundation</div> <div style="width: 85%;"></div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:1080</div> <div style="width: 85%;">Code of practice for design and construction of simple spread foundations.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:1904</div> <div style="width: 85%;">Code of practice for design and construction of foundations in Soils; General Requirements.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:2911</div> <div style="width: 85%;">Code of practice for designs and construction of Pile foundations (Relevant Parts).</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:2950</div> <div style="width: 85%;">Code of practice for designs and construction of Raft (Part-I) foundation.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:2974</div> <div style="width: 85%;">Code of practice for design and construction of machine</div> </div>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 61 OF 69


CLAUSE NO.	<div style="text-align: right;">  </div> GENERAL TECHNICAL REQUIREMENTS			
	<p>(Part-I TO V) foundations.</p> <p>IS:6403 Code of practice for determination of Allowable Bearing pressure on Shallow foundation.</p> <p>IS:8009 Code of practice for calculation of settlement of foundation subjected to symmetrical vertical loads.</p> <p>Part-I Shallow foundations.</p> <p>Part-II Deep foundations.</p> <p>IS:12070 Code of practice for design and construction of shallow foundations on rocks.</p> <p>DIN:4024 Flexible supporting structures for machines with rotating machines.</p> <p>VDI:2056 Criteria for assessing mechanical vibrations of machines.</p> <p>VDI:2060 Criteria for assessing rotating imbalances in machines.</p> <p>Roads</p> <p>IRC:5 Standard specifications and Code of practice for road bridges, section-I general Features of Design.</p> <p>IRC:14 Recommended practice of 2cm thick bitumen and tar carpets.</p> <p>IRC:16 Specification for priming of base course with bituminous primers.</p> <p>IRC:19 Standard specifications and code of practice for water bound macadam.</p> <p>IRC:21 Standard specifications and Code of practice for road bridges, section-III - Cement concrete (plain and reinforced).</p> <p>IRC:34 Recommendations for road construction in waterlogged areas.</p> <p>IRC:36 Recommended practice for the construction of earth embankments for road works.</p> <p>IRC:37 Guidelines for the Design of flexible pavements.</p> <p>IRC:56 Recommended practice for treatment of embankment slopes for erosion control.</p> <p>IRC:73 Geometric design standards for rural (non-urban) highways.</p> <p>IRC:86 Geometric Design standards for urban roads in plains.</p> <p>IRC:SP:13 Guidelines for the design of small bridges & culverts.</p> <p>IRC - Public- Ministry of Surface Transport (Roads Wing), Specifications for road and bridge works.</p> <p>IS:73 Specification for paving bitumen</p>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 62 OF 69


CLAUSE NO.	<div style="text-align: center;">GENERAL TECHNICAL REQUIREMENTS</div> <div style="float: right;">  </div>			
	<p>Loadings</p> <p>IS:875 Code of practice for design loads other than earthquake) for (Pt. I to V) buildings and structures.</p> <p>IS:1893 Criteria for earthquake resistant design of structures.</p> <p>IS:4091 Code of Practice for design and construction of foundation for transmission line towers & poles.</p> <p>IRC:6 Standard specifications & code of practice for road bridges, Section-II Loads and stresses.</p> <p>M.O.T. Deptt. of railways Bridge Rules.</p> <p>Safety</p> <p>IS:3696 Safety code for scaffolds and ladders. (Part I & II)</p> <p>IS:3764 Safety code for excavation work.</p> <p>IS:4081 Safety code for blasting and related drilling operations.</p> <p>IS:4130 Safety code for demolition of buildings.</p> <p>IS:5121 Safety code for piling and other deep foundations.</p> <p>IS:5916 Safety code for construction involving use of hot bituminous materials.</p> <p>IS:7205 Safety code for erection on structural steelwork.</p> <p>IS:7293 Safety code for working with construction machinery.</p> <p>IS:7969 Safety code for handling and storage of building materials</p> <p>IS:11769 Guidelines for safe use of products containing asbestos.</p> <p>- Indian Explosives Act. 1940 as updated.</p> <p>Architectural design of buildings</p> <p>SP:7 National Building Code of India</p> <p>SP:41 Hand book on functional requirements of buildings (other than industrial buildings)</p> <p>Miscellaneous</p> <p>IS:802 Code of practice for use of structural steel in (Relevant parts) overhead transmission line towers.</p> <p>IS:803 Code of practice for design, fabrication and erection of vertical mild steel cylindrically welded in storage tanks.</p>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 63 OF 69

CLAUSE NO.	GENERAL TECHNICAL REQUIREMENTS			<div>एनटीपीसी NTPC</div>
	<div>IS:10430Creteria for design of lined canals and liner for selection of type of lining.</div> <div>IS:11592Code of practice for selection and design of belt conveyors.</div> <div>IS:12867PVC handrails covers.</div> <div>CIRIADesign and construction of buried thin-wall pipes.</div> <div>Publication</div> <div>REFERENCE CODES AND STANDARDS FOR CONTROL AND INSTRUMENTATION</div> <div>The design, manufacture, inspection, testing & installation of all equipment and system covered under this specification shall conform to the latest editions of codes and standards mentioned below and all other applicable VDE, IEEE, ANSI, ASME, NEC, NEMA, ISA AND Indian Standards and their equivalents.</div> <div>Temperature Measurements</div> <div><div>1.Instrument and apparatus for temperature measurement - ASME PTC 19.3 (1974).</div><div>2.Temperature measurement - Thermocouples ANSI MC 96.1 - 1982.</div><div>3.Temperature measuremnet by electrical Resistance thermometers - IS:2806.</div><div>4.Thermometer - element - Platinum resistance - IS:2848.</div></div> <div>Pressure Measurements</div> <div><div><div>1.a)Instruments and apparatus for pressure measurement - ASME PTC 19.2 (1964).</div><div>b)Electronic transmitters BS:6447.</div></div><div>2.Bourdon tube pressure and vacuum gauges - IS:3624 - 1966.</div><div>3.Process operated switch devices (Pr. Switch) BS-6134.</div></div> <div>Flow Measurements</div> <div>Instruments and apparatus for flow measurements - ASME PTC 19.5 (1972) Interim supplement, Part-II.</div> <div>Measurement of fluid flow in closed conduits - BS-1042.</div> <div>Electronic Measuring Instrument & Control Hardware/ Software</div> <div><div>1Automatic null balancing electrical measuring instruments - ANSI C 39.4 (Rev. 1973): IS:9319.</div><div>2Safety requirements for electrical and electronic measuring and controlling instrument - ANSI C 39.5 - 1974.</div></div>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 64 OF 69

CLAUSE NO.	<div style="text-align: center;"> GENERAL TECHNICAL REQUIREMENTS  </div>			
	<ol style="list-style-type: none"> 3. Compatability of analog signals for electronic industrial process instruments - ISA - S 50.1 (1982) ANSI MC 12.1 - 1975. 4. Dynamic response testing of process control instrumentation ISA - S 26 (1968). 5. Surge Withstand Capability (SWC) tests - ANSI C 37.90 a/IEEE-472 or suitable class of IEC-255-4 equivalent to ANSI C37.90a/IEEE-472. 6. Printed circuit boards - IPC TM - 650, IEC 326 C. 7. General requirement and tests for printed wiring boards - IS 7405 (Part-I) 1973. 8. Edge socket connectors - IEC 130-11. 9. Requirements and methods of testing of wire wrap terminations DIN 41611 Part-2. 10. Dimensions of attachment plugs & receptacles - ANSI C 73 - 1973 (Supplement ANSI C 73 a - 1980). 11. Direct acting electrical indicating instrument - IS:1248 - 1968 (R). 12. Standard Digital Interface for Programmable Instrumentation - IEEE-488.2 - 1990. 13. Information Processing Systems - Local Area Networks - Part 2 : Logical Link Control - IEEE-802.2 - 1989. 14. Standard for Local Area Networks : Carrier Sense Multiple Access with Collision Detection - IEEE-802.3 - 1985. 15. Supplements A, B, C and E to Carrier Sense Multiple Access with Collision Detection - IEEE-802.3 - 1988. 16. Standard for Local Area Networks : Token - Passing Bus Access Method - IEEE-802.4 - 1985. 17. Standard for Local Area Networks : Token - Ring Access Method and Physical Layer Specification - IEEE-802.5 - 1985. 18. IEEE Guide to Software Requirements Specifications - IEEE-830 - 1984. 19. Hardware Testing of Digital Process Computers - ISA RP55.1 - 1983. 20. Electromagnetic Susceptibility of Process Control Instrumentation - SAMA PMC 33.1 - 1978. 21. Interface Between the Data Terminal Equipment and Data Circuit - Terminating Equipment Employing Serial Binary Data Interchange - EIA-232-D-1987. 22. Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment, Part 3 : Radiated Electromagnetic Field Requirements - IEC 801-3-1984. 			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 65 OF 69

CLAUSE NO.	<div style="text-align: center;">GENERAL TECHNICAL REQUIREMENTS</div> <div style="float: right;">  </div>			
	<p>Instrument Switches and Contact</p> <ol style="list-style-type: none"> Contact rating - AC services NEMA ICS 2 - 1978 (with revision through May 1983), Part - 2-125, A6000. Contact rating - DC services NEMA ICS 2-1978 Part-2 125, N600. <p>Enclosures</p> <ol style="list-style-type: none"> Type of Enclosures - NEMA ICS Part - 6 - 1978 (with Rev. 1 4/80) through 110.22 (Type 4 to 13). Racks, panels and associated equipment - EIA : RS - 310 C- 1983 (ANSI C 83.9 - 1972). Protection class for Enclosures, cabinets, control panels & desks - IS:2147 - 1962. <p>Apparatus, enclosures and installation practices in hazardous area</p> <ol style="list-style-type: none"> Classification of hazardous area - NFPA 70 - 1984, Article 500. Electrical Instruments in hazardous dust location - ISA - 512.11, 1973. Intrinsically safe apparatus - NFPA 493 1978. Purged and pressurised enclosure for electrical equipment in hazardous location - NFPA 496-1982. Enclosures for Industrial Controls and Systems - NEMA IS 1.1 - 1977. <p>Sampling System</p> <ol style="list-style-type: none"> Stainless steel material of tubing and valves for sampling system - ASTM 296-82, Grade 7 P 316. Submerged helical coil heat exchangers for sample coolers ASTM D11 92-1977. Water and steam in power cycle - ASME PTC 19.11. Standard methods of sampling system - ASTM D 1066-99. <p>Annunciators</p> <ol style="list-style-type: none"> Specifications and guides for the use of general purpose annunciators - ISA S 19.1, 1979. Surge withstand capability tests - ANSI C 37.90a - 1989/IEEE-472 or suitable class of IEC 255-4 equivalent to ANSI C37.90a 1989/IEEE-472 Damp heat cycling test - IS:2106 Specification for Electromagnetic Susceptibility - SAMA DMC 33, 1/78 			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 66 OF 69

CLAUSE NO.	<div style="text-align: center;"> GENERAL TECHNICAL REQUIREMENTS  </div>			
	<p>Protections</p> <ol style="list-style-type: none"> Relays and relay system associated with electric power apparatus. ANSI C 37.90, 1 - 1989. General requirements & tests for switching devices for control and auxiliary circuits including contactor relays - IS:6875 (Part-I) - 1973. Turbine water damage prevention - ASME TDP-1-1980. Boiler safety interlocks - NFPA Section 85 B - 1984, 85 C - 1991. <p>UPS System</p> <ol style="list-style-type: none"> Practices and requirements for semi-conductor power rectifiers - ANSI C 34.2, 1973. Relays and relays system associated with electrical power apparatus - ANSI C 3.90 - 1983. Surge withstand capability test - ANSI C 37.90 1 -1989. Performance testing of UPS - IEC 146. Stationary cells & Batteries Lead Acid type (with tubular positive plates) specification IS-1651-1991. Recommended practice for sizing large lead storage batteries for generating stations & sub-stations - IEEE-485-1985. Printed Circuit Board - IPC TM 650, IEC 326C. General Requirements & tests for printed wiring boards, IS:7405 (Part-I) 1973. <p>Control Valves</p> <ol style="list-style-type: none"> Control valve sizing - Compressible & Incompressible fluids - ISA S 75.01-1985. Face to face dimensions of control valves - ANSI B 16.00 - 1973. ISA Hand Book of Control Valves - (ISBN : B: 1047-087664-234-2). Codes for pressure piping - ANSI B 31.1 Control Valve leak class - ISA RP 39.6 <p>Process Connection & Piping</p> <ol style="list-style-type: none"> Codes for pressure piping "power piping" - ANSI B 31.1. Seamless carbon steel pipe ASTM - A - 106. Forged & Rolled Alloy steel pipe flanges, forged fittings and valves and parts - ASTM - A - 182. 			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 67 OF 69

CLAUSE NO.	<div style="text-align: center;"> GENERAL TECHNICAL REQUIREMENTS  </div>			
	<p>4. Material for socket welded fittings - ASTM - A - 105.</p> <p>5. Seamless ferritic alloy steep pipe - ASTM - A - 335.</p> <p>6. Pipe fittings of wrought carbon steel and alloy steel - ASTM - A - 234.</p> <p>7. Composition bronze of ounce metal castings - ASTM - B - 62.</p> <p>8. Seamless Copper tube, bright annealed - ASTM - B - 168.</p> <p>9. Seamless copper tube - ASTM - B - 75.</p> <p>10. Dimension of fittings - ANSI - B - 16.11.</p> <p>11. Valves flanged and butt welding ends - ANSI - B - 16.34.</p> <p>Instrument Tubing</p> <p>1. Seamless carbon steel pipe - ASTM - A 106.</p> <p>2. Material of socketweld fittings - ASTM - A105.</p> <p>3. Dimensions of fittings - ANSI - B - 16.11.</p> <p>4. Code for pressure piping, welding, hydrostatic testing - ANSI B 31.1.</p> <p>Cables</p> <p>1. Thermocouples extension wires/cables - ANSI MC 96.1 - 1992.</p> <p>2. Requirements for copper conductor-Wiring cables for telecommunications & information processing system - VDE:0815.</p> <p>3. Colour coding of single or multi-pair cables - ICEA - S - 61-402 (third edition) NEMA WCS - 1979 with revisions thorough 2/83.</p> <p>4. Insulation & Sheathing compounds for cables : VDE 0207 (Part-4, 5 & 6).</p> <p>5. Guide design and installation of cable systems in power generating stations (insulation, jacket materials) - IEEE Std. 422-1977.</p> <p>6. Rules for Testing insulated cables and flexible cables : VVDE - 0472</p> <p>7. Requirements of vertical flame propagation test - IEEE 383 - 1974 (R 1980)</p> <p>8. Standard specification for tinned soft or annealed copper wire for electrical purpose - ASTM B-33-81.</p> <p>9. Oxygen index and temperature index test - ASTM D - 2863.</p> <p>10. Smoke density measurement test - ASTMD - 2843.</p> <p>11. Acid gas generation test - IEC - 754 - 1.</p>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 68 OF 69

CLAUSE NO.	<div>एनटीपीसी NTPC</div> <div>GENERAL TECHNICAL REQUIREMENTS</div>			
	<div><div>12. Swedish Chimney test - SEN - 4241475 (F3).</div><div>13. Teflon (FEP) insulation & sheath test - ASTM D - 2116.</div><div>14. Thermocouple compensating cables - Testing requirements & sampling plan IS:8784.</div><div>15. PVC insulated electric cables for working voltage upto and including 1100 V - IS:1554 (Part-I).</div><div>Cable Trays, Conduits</div><div>1. Guide for design and installation of cable systems in power generating station (Cable trays, support systems, conduits) - IEEE Std. 422, 1977, NEMA VE-1 1979, NFPA 70-1984.</div><div>2. -do- Test Standards. NEMA VE-1-1979.</div><div>3. Zinc coating "hot dip" on assembled products for galvanising of carbon steel cable trays - ASTM A - 386-78.</div><div>Public Address System</div><div>1. Specifications for loud speakers - IS:7741 (Part-I, II and III)</div><div>2. Code of safety requirement for electric mains operated audio amplifiers - IS:1301</div><div>3. Specification for Public Address Amplifiers - IS:10426.</div><div>4. Code of practice for outdoor installation of PA system - IS:1982.</div><div>5. Code of practice for installation for indoor amplifying and sound distribution system - IS:1881.</div><div>6. Basic environmental testing procedures for electronic and electrical items - IS:9000.</div><div>7. Characteristics and methods of measurements for sound system equipment - IS:9302</div><div>8. Code of practice of electrical wiring installations (System voltage not exceeding 650 volts) - IS:732</div><div>9. Rigid steel conduits for electric wiring - IS:9537 (Part-I and II)</div><div>10. Fittings for rigid steel conduits for electrical wiring - IS:2667</div><div>11. Degree of protection provided by enclosure for low voltage switchgear and control gear - IS:2147.</div><div>Vibration Monitoring System</div><div>1. API 670 - 1994</div><div>2. BS : 4675 Part-2</div></div>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME- VI GENERAL TECHNICAL REQUIREMENTS	PAGE 69 OF 69

<div>MFGR.'s LOGO</div>	<div>MANUFACTURER'S NAME AND ADDRESS</div>	<div>MANUFACTURING QUALITY PLAN</div>		<div>PROJECT : PACKAGE : CONTRACT NO. : MAIN-SUPPLIER:</div>
		<div>ITEM :</div>	<div> <div>QP NO.:</div> <div>REV.NO.:</div> <div>DATE:</div> <div>PAGE: OF ...</div> </div>	

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ENGG. DIV./QA&I

SUPPLIER'S LOGO	SUPPLIER'S NAME AND ADDRESS	FIELD QUALITY PLAN		PROJECT : PACKAGE : CONTRACT NO. : MAIN-SUPPLIER:
		ITEM :	QP NO.: REV. NO.: DATE: PAGE: OF	

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		LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. LEGEND TO BE USED: CLASS # : A = CRITICAL, B=MAJOR, C=MINOR; 'A' SHALL BE WITNESSED BY NVVN FQA, 'B' SHALL BE WITNESSED BY NVVN ERECTION / CONSTRUCTION DEPT. AND 'C' SHALL BE WITNESSED BY MAIN SUPPLIER (A & B CHECK SHALL BE NVVN CHP STAGE)		DOC. NO.:		REV.	
MANUFACTURER/ SUB-SUPPLIER	MAIN-SUPPLIER		FOR NVVN USE				
SIGNATURE				REVIEWED BY	APPROVED BY	APPROVAL SEAL	

ENGG. DIV./QA&I

ANDAMAN & NICOBAR GAS POWER PROJECT (50 MW)	TECHNICAL SPECIFICATION SECTION – VI, PART-A	VOLUME – VI GENERAL TECHNICAL REQUIREMENT	PAGE 69 OF 71
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No.25-11/6/2018-PG
Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg, New Delhi – 110001
Tele Fax: 011-23730264

Dated 02/07/2020

ORDER

Power Supply System is a sensitive and critical infrastructure that supports not only our **national defence, vital emergency services** including health, disaster response, **critical national infrastructure** including classified data & communication services, defence installations and manufacturing establishments, logistics services but also the **entire economy** and the **day-to-day life** of the citizens of the country. Any danger or threat to Power Supply System can have catastrophic effects and has the potential to cripple the entire country. Therefore, the Power Sector is a **strategic and critical sector**.

The vulnerabilities in the Power Supply System & Network mainly arise out of the possibilities of cyber attacks through malware / Trojans etc. embedded in imported equipment. Hence, **to protect the security, integrity and reliability of the strategically important and critical Power Supply System & Network** in the country, the following directions are hereby issued :-

(1) All equipment, components, and parts imported for use in the Power Supply System and Network shall be tested in the country to check for any kind of embedded malware/trojans/cyber threat and for adherence to Indian Standards.

(2) All such testings shall be done in certified laboratories that will be designated by the Ministry of Power (MoP).

(3) Any import of equipment/components/parts from "prior reference" countries as specified or by persons owned by, controlled by, or subject to the jurisdiction or the directions of these "prior reference" countries will require prior permission of the Government of India

(4) Where the equipment/components/parts are imported from "prior reference" countries, with special permission, the protocol for testing in certified and designated laboratories shall be approved by the Ministry of Power (MoP).

This order shall apply to any item imported for end use or to be used as a component, or as a part in manufacturing, assembling of any equipment or to be used in power supply system or any activity directly or indirectly related to power supply system.

This issues with the approval of Hon'ble Minister of State for Power and New & Renewable Energy (Independent Charge).


(Goutam Ghosh)
Director
Tel: 011-23716674

To:

1. All Ministries/Departments of Government of India (As per list)
2. Secretary (Coordination), Cabinet Secretariat
3. Vice Chairman, NITI Aayog
4. Comptroller and Auditor General of India
5. Chairperson, CEA
6. CMDs of CPSEs/Chairman of DVC & BBMB/MD, EESL/DG, NPTI/DG, CPRI/DG, BEE/
7. All ASs/JSs/EA, MoP

Copy:

1. PS to Hon'ble PM, Prime Minister's Office
2. PS to Hon'ble MOS(IC) for Power and NRE
3. Sr. PPS to Secretary(Power)

GENERAL TECHNICAL REQUIREMENTS (Annexure-VI)

S.No	Description of Drgs/Docs	No of Prints	No of CD ROMs/DVDs/Portable Hard Disk
1	Drawings, Data sheets, Design calculations, Purchase specifications and other documents		
	First submission and submission with major changes		
	■ Layout (A0&A1 sizes)	4	-
	■ Other Drawings/Documents (A0&A1 sizes)	2	-
	■ P&ID (All sizes)	4	-
	a) Final drawings/documents (Directly to site)	6	2
	b) "As Built" Drawing/Documents (Directly to site)	6	2
	c) Analysis reports of Equipments / piping /structures components/system employing software packages as detailed in the specifications.	2	2
2	Erection Manual (Directly to site)	4 sets	2
3	Operation & Maintenance manual i) First Submission	1 set	--
	ii) Final Submission (Directly to site)	4 sets	2
4	Plant Hand Book i) First Submission	1	1
	Commissioning and Performance Test Procedure manual i) First Submission	1 set	--
5	ii) Final Submission (Directly to site)	4 sets	2

GENERAL TECHNICAL REQUIREMENTS (Annexure-VI)

S.No	Description of Drgs/Docs	No of Prints	No of ROMs/DVDs/Portable Hard Disk
6	Performance and Functional Guarantee Test Report i) First Submission	2 sets	—
	ii) Approved Copies (Direct to Site)	4 sets	2
7	Project Completion Report (Directly to site)	6 sets	2
8	QA programme including Organisation for implementation and QA system manual(with revisions)	1	—
9	Vendor details in respect of proposed vendors including contractor's evaluation report.	2	—
10	Manufacturing QPs, Field QPs, Field welding schedules and their reference document like test procedures, WPS, POR etc i) For review/comment	1	—
	ii) Approved final copies of Field QPs, Field welding schedules and their reference document like test procedures, WPS, POR etc (Direct to Site)	4	2
11	Welding Manual, Heat Treatment Manuals, Storage & preservation manuals i) For review/comment	1 set	—
	ii) Approved copies (Direct to Site)	4 sets	2
12	QA Documentation Package for items / equipment manufactured and despatched to site	2 sets	2
13	QA Documentation Package for field activities on equipment/systems at site	2 sets	2

Appendix II

No. A-1/2021-FSC-Part(5)

Government of India

Ministry of Power

Shram Shakti Bhawan, New Delhi

Dated: 16th November, 2021

ORDER

Subject: Public Procurement (Preference to Make in India) to provide for Purchase Preference (linked with local content) in respect of Power Sector.

Reference: Department for Promotion of Industry and Internal Trade (DPIIT) Notification No. P-45021/2/2017-PP (BE-II) dated 16.09.2020.

The Government of India, Department for Promotion of Industry and Internal Trade (DPIIT) issued Public Procurement (Preference to Make in India), Order 2017, for encouraging 'Make in India' and promoting manufacturing and production of goods and services in India with a view to enhancing income and employment. Subsequently, DPIIT vide order No. P-45021/2/2017-PP (BE-II) dated 4th June, 2020 and further vide order dated 16th September, 2020 have issued the revised Public Procurement (Preference to Make in India) Order 2017.

2. In light of the Public Procurement (Preference to Make in India) Order 2017, this Ministry had notified purchase preference (linked with local content) for Hydro and Transmission sectors vide Order No. 11/05/2018-Coord dated 20.12.2018, for Thermal sector vide Order dated 28.12.2018 and for Distribution sector vide Order dated 17.03.2020. Further, a combined order dated 04.04.2020 was also issued in supersession of all previous orders to indicate equipment/material/components for which there was sufficient local capacity and competition and also to indicate conditions for including suitably in the tenders to be issued by the procurers. In furtherance of Para 19 of the DPIIT Notification No. P-45021/2/2017-PP(BE-II) dated 04.06.2020, Ministry of Power (MoP) issued a revised comprehensive Order dated 28.07.2020 (Annexure-I amended by order dated 17.09.2020).

3. DPIIT Notification No. P-45021/2/2017-PP(BE-II) dated 16.09.2020 has further revised its order dated 04.06.2020. Therefore, in supersession of all the aforementioned orders including order No.10/1/2019-St.Th. (Part-II) dated 20.03.2020 issued by this Ministry, the following has been decided:

- i. For the purpose of this order, the definitions of various terms used in the order, and provisions relating to (i) Eligibility of 'Class-I local supplier'/'Class-II local supplier'/'Non-local suppliers' for different types of procurement, (ii) purchase preference (iii) exemption to small purchases and (iv) margin of purchase preference shall be the same as in DPIIT order dated 16.09.2020, referred to above and extracts of the same is given at **Appendix**.
- ii. In procurement of all goods and services or works in respect of which there is sufficient local capacity and local competition as in **Annexure-I**, only "Class-I local supplier" shall be eligible to bid irrespective of purchase value. "Class-I local supplier" is a supplier or service provider whose goods, services or works offered for procurement meets the Minimum Local Content (MLC) as prescribed in Annexure-I of this order. "Class-II local supplier" means a

supplier, as defined by DPIIT in its Order No. P-45021/2/2017-PP (BE-II) dated 16-09-2020.

- iii. In the procurement of all goods and services or works other than those listed in Annexure-I, only "Class-I local supplier" and "Class-II local supplier" as defined in the order of this Ministry herewith shall be eligible to bid in procurement undertaken by procuring entities, except when Global Tender Enquiry has been issued. In Global tender enquiries, "Non-local suppliers" shall also be eligible to bid along with "Class-I local suppliers" and "Class-II local suppliers". In procurement of all goods, services or works not covered by sub-para 3(ii) above, and with estimated value of purchases less than Rs. 200 crores, in accordance with Rule 161(iv) of GFR, 2017, Global Tender Enquiry(GTE) shall not be issued except with the approval of the competent authority as designated by Department of Expenditure.
- iv. For the purpose of this order, 'Works' means all works as per Rule 130 of GFR- 2017, and will also include 'turnkey works', Engineering, Procurement and Construction (EPC) contracts and service contracts including System Integrator (SI) contracts.

4. The list of items, in respect of which, local capacity with sufficient competition exists as per **Annexure-I**, will be reviewed at regular intervals with a view to increase number of items in this list and also to increase the MLC for each item, wherever it is less than 100%.

5. Purchase preference shall be given to local suppliers in accordance with **para 3A** of DPIIT Order dated 16.09.2020, and extracts of the same are given at **Appendix**.

6. Further, it has been decided to constitute a committee for independent verification of self-declarations and auditor's / accountant's certificates on random basis and in the case of complaints. The composition of the committee is given below:

Member (Planning), Central Electricity Authority (CEA)	Chairperson
Chief Engineer (PSETD), CEA	Member
Chief Engineer (HETD), CEA	Member
Chief Engineer (TETD), CEA	Member
Chief Engineer (DP&R), CEA	Member
As may be co-opted by CEA	External Expert
Chief Engineer (R&D), CEA	Convener

7. Further, it has also been decided to constitute a committee to examine the grievances in consultation with stakeholders and recommend appropriate actions to the Competent Authority in MoP. The composition of the Committee is given below:

Chairperson, CEA	Chairperson
Member (Hydro), CEA	Member

Member (Power System), CEA	Member
Member (Thermal), CEA	Convener

8. The complaint fee of Rs. 2 Lakhs or 1% of the value of the local item being procured (subject to maximum of Rs. 5 Lakhs), whichever is higher, shall be paid in the form of Demand Draft, drawn in favour of **PAO, CEA, New Delhi**. In case the complaint is found to be incorrect, the complaint fee shall be forfeited. In case, the complaint is upheld and found to be substantially correct, the deposited fee of the complainant would be refunded without any interest.

9. All other conditions, not stipulated in this order, shall be as laid down in the DPIIT's order No. P-45021/2/2017-PP (BE-II) dated 16.09.2020.

10. This order shall be applicable in respect of the procurement made by all attached or subordinate offices or autonomous bodies under the Government of India including Government Companies as defined in the Companies Act, and /or the States and Local Bodies making procurement under all Central Schemes/ Central Sector Schemes where the Scheme is fully or partially funded by the Government of India. The aforesaid orders shall also be applicable in respect of projects wherein funding of goods, services or works is by Power Finance Corporation (PFC) /Rural Electrification Corporation (REC) and any Financial Institution in which Government of India/ State Government share exists. This order shall be applicable to Tariff Based Competitive Bidding (TBCB) projects also. Procuring entities as defined in the DPIIT's Order dated 16.09.2020 are advised to revise their tender documents to fully comply with the said DPIIT's Order and the subsequent Orders that would be issued in this regard by DPIIT/ this Ministry from time to time.

11. All tenders for procurement by Central Government Agencies or the States and Local Bodies, as the case may be, have to be certified for compliance of the Public Procurement (Preference to Make in India) 'PPP-MII' Order by the concerned procurement officer of the Government Organization before uploading the same on the portal.

12. Exemption from meeting the stipulated local content is allowed as per clause 13 and 13A of PPP-MII Order dated 16.09.2020, if the manufacturer declares that the item is manufactured in India under a License from a foreign Manufacturer who holds Intellectual Property Rights (IPRs) and there is Transfer of Technology (ToT) with phasing to increase Minimum Local Content. For such items, if any CPSE under the administration of Ministry of Power requests exemption for any item, it shall be considered by Ministry of Power, on case to case basis.

13. In order to further encourage Make in India initiatives and promote manufacturing and production of goods and services in India, general guidelines as enclosed at **Annexure-II** may be adopted in an appropriate manner according to the circumstances by the procuring entities in their tendering process.

14. The procurers may specify the higher values of MLC than those specified in this Order in respect of goods, services or works covered in their tenders and award the weightage to the product of higher MLC for which they have to specify the criteria beforehand in their tender. The values given in Annexure-I are the minimum prescribed values for becoming a class-I local supplier for the products indicated therein.

15. This issues with the approval of Hon'ble Minister for Power and New & Renewable Energy.



(S. Majumdar)

Under Secretary to the Government of India
Tele No. 011- 23356938

To:

1. Secretary to Government of India (All Ministries/ Departments of Government of India) (As per list)
2. Secretary (Coordination), Cabinet Secretariat
3. CEO, NITI Aayog
4. Chief Secretaries of all States/ UTs
5. Comptroller and Auditor General of India
6. Secretary, DPIIT, Chairman of Standing Committee for implementation of Public Procurement Order, 2017
7. Director General, Bureau of Indian Standards (BIS)
8. Joint Secretary, DPIIT, Member-Convener of Standing Committee for implementation of Public Procurement Order, 2017
9. Chairperson, CEA
10. CMDs of CPSEs, CMD NLC, Chairman of DVC/ BBMB/ EESL, DGs of BEE/ CPRI/ NPTI
11. All Additional Secretaries/ JSs/ EA/ CE, Ministry of Power

Copy to:

Director (Technical), NIC with a request to publish the Order on the website of Ministry of Power

APPENDIX

Extracts of important provisions contained in DPIIT Order No. P-45021/2/2017-PP (BE-II) dated 16-09-2020

1. **Definitions** (*Para 2 of DPIIT order*):

'Local content' means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.

'Class-I local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-I local supplier' under this Order.

'Class-II local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-II local supplier' but less than that prescribed for "Class-I Local supplier" under this Order.

'Non-Local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, has local content less than that prescribed for 'Class-II local supplier' under this Order.

'L1' means the lowest tender or lowest bid or the lowest quotation received in a tender, bidding process or other procurement solicitation as adjudged in the evaluation process as per the tender or other procurement solicitation.

'Margin of purchase preference' means the maximum extent to which the price quoted by a 'Class-I local supplier' may be above the L1 for the purpose of purchase preference.

'Nodal Ministry' means the Ministry or Department identified pursuant to this order in respect of a particular item of goods or services or works.

'Procuring entity' means a Ministry or department or attached or subordinate office of, or autonomous body controlled by, the Government of India and includes Government companies as defined in the Companies Act.

'Works' means all works as per Rule 130 of GFR- 2017, and will also include 'turnkey works'.

2. **Eligibility of 'Class-I local supplier'/ 'Class-II local supplier'/ 'Non-local suppliers' for different types of procurement** (*Para 3 of DPIIT order*)

(a) In procurement of all goods, services or works in respect of which the Nodal Ministry / Department has communicated that there is sufficient local capacity and local competition, only 'Class-I local supplier', as defined under the Order, shall be eligible to bid irrespective of purchase value.

(b) Only 'Class-I local supplier' and 'Class-II local supplier', as defined under the Order, shall be eligible to bid in procurements undertaken by procuring entities, except when Global tender enquiry has been issued. In global tender enquiries, 'Non-local suppliers' shall also be eligible to bid along with 'Class-I local suppliers' and 'Class-II local suppliers'. In procurement of all goods, services or works, not covered by 3(a) above, and with estimated value of purchases less than Rs 200 crores, in accordance with Rule 161(iv) of GFR, 2017 Global tender enquiry shall not

be issued except with the approval of competent authority as designated by Department of Expenditure.

(c) For the purpose of this Order, works includes Engineering, Procurement and Construction (EPC) contracts and services include System Integrator (SI) contracts.

3. Purchase Preference (Para 3A of DPIIT order)

(a) Subject to the provisions of this Order and to any specific instructions issued by the Nodal Ministry or in pursuance of this Order, purchase preference shall be given to 'Class-I local supplier' in procurements undertaken by procuring entities in the manner specified here under.

(b) In the procurements of goods or works, which are covered by para 3(b) of DPIIT Order No. P-45021/2/2017-PP(BE-II) dated 16-09-2021 and which are divisible in nature, the "Class-I local supplier" shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

- i. Among all qualified bids, the lowest bid will be termed as L1. If L1 is 'Class-I local supplier', the contract for full quantity will be awarded to L1.
- ii. If L1 bid is not a 'Class-I local supplier', 50% of the order quantity shall be awarded to L1. Thereafter, the lowest bidder among the 'Class-I local supplier' will be invited to match the L1 price for the remaining 50% quantity subject to the Class-I local supplier's quoted price falling within the margin of purchase preference, and contract for that quantity shall be awarded to such 'Class-I local supplier' subject to matching the L1 price. In case such lowest eligible 'Class-I local supplier' fails to match the L1 price or accepts less than the offered quantity, the next higher 'Class-I local supplier' within the margin of purchase preference shall be invited to match the L1 price for remaining quantity and so on, and contract shall be awarded accordingly. In case some quantity is still left uncovered on Class-I local suppliers, then such balance quantity may also be ordered on the L1 bidder.

(c) In the procurements of goods or works, which are covered by para 3(b) of DPIIT Order No. P-45021/2/2017-PP(BE-II) dated 16-09-2021 and which are not divisible in nature, and in procurement of services where the bid is evaluated on price alone, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

- iii. Among all qualified bids, the lowest bid will be termed as L1. If L1 is 'Class-I local supplier', the contract will be awarded to L1,
- iv. If L1 is not 'Class-I local supplier', the lowest bidder among the 'Class-I local supplier', will be invited to match the L1 price subject to Class-I local supplier's quoted price falling within the margin of purchase preference, and the contract shall be awarded to such 'Class-I local supplier' subject to matching the L1 price.
- v. In case such lowest eligible 'Class-I local supplier' fails to match the L1 price, the 'Class-I local supplier' with the next higher bid within the margin of purchase preference shall be invited to match the L1 price and so on and contract shall be awarded accordingly. In case none of the 'Class-I local supplier' within the margin of purchase preference matches the L1 price, the contract may be awarded to the L1 bidder.

(d) "Class-II local supplier" will not get purchase preference in any procurement, undertaken by procuring entities.

4. Applicability in tenders where contract is to be awarded to multiple bidders (Para 3B of DPIIT order)-

In tenders where contract is to be awarded to multiple bidders subject to matching of L1 rates or otherwise, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

a) In case there is sufficient local capacity and competition for the items to be procured, as notified by the Nodal Ministry, only 'Class-I local supplier' shall be eligible to bid. As such, the multiple supplier who would be awarded the contract, should be all and only 'Class-I local suppliers'.

b) In other cases, 'Class-II local suppliers' and 'Non-Local suppliers' may also participate in the bidding process along with 'Class-I local supplier' as per provisions of this order.

c) If 'Class-I local supplier' qualify for award of contract for at least 50% of the tendered quantity in any tender, the contract may be awarded to all the qualified bidders as per award criteria stipulated in the bid documents. However, in case 'Class-I local supplier' do not qualify for award of the contract for at least 50% of the tendered quantity, purchase preference should be given to the 'Class-I local supplier' over 'Class-II local supplier'/'Non-local suppliers' provided that their quoted rate falls within 20% margin of purchase preference of the highest quoted bidder considered for award of contract so as to ensure that the 'Class-I local suppliers' taken in totality or considered for award of contract for at least 50% of the tendered quantity.

d) First purchase preference has to be given to the lowest quoting 'Class-I local supplier', whose quoted rates fall within 20% margin of purchase preference subject to its meeting the prescribed criteria for award of contract as also the constraints of maximum quantity that can be sourced from any single supplier. If the lowest quoting 'Class-I local supplier', does not qualify for purchase preference because of aforesaid constraints or does not accept the offered quantity, an opportunity may be given to next higher 'Class-I local supplier' falling within 20% margin of purchase preference, and so on.

e) To avoid any ambiguity during bid evaluation process, the procuring entities may stipulate its own tender specific criteria for award of contract amongst different bidders including the procedure for purchase preference to 'Class-I local supplier' within the broad policy guidelines stipulate in sub-paras above.

5. Exemption of small purchases (Para 4 in DPIIT order): Procurements where the estimated value to be procured is less than Rs. 5 lakhs shall be exempt from this Order. However, it shall be ensured by procuring entities that procurement is not split for the purpose of avoiding the provisions of this Order.

6. Minimum Local Content (Para 5 in DPIIT order): The 'local content' requirement to categorize a supplier as 'Class-I local supplier' is minimum 50%. For 'Class-II local supplier', the local content requirement is minimum 20%. Nodal Ministry/Department may prescribe only a higher percentage of minimum local content requirement to categorize a supplier as 'Class-I local supplier'/'Class-II local supplier'. For the item for which Nodal Ministry/Department has not prescribed higher minimum local content notification under the order, it shall be 50% and 20% for 'Class-I local supplier'/'Class-II local supplier' respectively.

7. Vide DPIIT OM No. P-45021/102/2019-BE-IIPart(1) (E-50310) dated 4.03.2021 services such as transportation, insurance, installation, commissioning, training and after sales service support like AMC/CMC etc. shall not be considered as local value addition. Bidders offering imported products will fall under the category of Non- local suppliers. They can't claim themselves as Class-I local suppliers/Class-II local suppliers by claiming the services such as transportation, insurance, installation, commissioning, training and after sales service support like AMC/CMC etc. as local value addition.
8. **Margin of Purchase Preference** (*Para 6 of DPIIT order*): The margin of purchase preference shall be 20%.
9. **Specifications in Tenders and other procurement solicitations** (*Para 10 of DPIIT order*):
- a. Every procuring entity shall ensure that the eligibility conditions in respect of previous experience fixed in any tender or solicitation do not require proof of supply in other countries or proof of exports.
 - b. Procuring entities shall endeavour to see that eligibility conditions, including on matters like turnover, production capability and financial strength do not result in unreasonable exclusion of 'Class-I local supplier'/ 'Class-II local supplier' who would otherwise be eligible, beyond what is essential for ensuring quality or creditworthiness of the supplier.
 - c. Procuring entities shall, within 2 months of the issue of this Order review all existing eligibility norms and conditions with reference to sub-paragraphs 'a' and 'b' above.
 - d. **Reciprocity Clause:**
 - i. When a Nodal Ministry/Department identifies that Indian suppliers of an item are not allowed to participate and/ or compete in procurement by any foreign government, due to restrictive tender conditions which have direct or indirect effect of barring Indian companies such as registration in the procuring country, execution of projects of specific value in the procuring country etc. it shall provide such details to all its procuring entities including CMDs/CEOs of PSEs/PSUs, State Governments and other procurement agencies under their administrative control and GeM for appropriate reciprocal action.
 - ii. Entities of countries which have been identified by the nodal Ministry/Department as not allowing Indian companies to participate in their Government procurement for any item related to that nodal Ministry shall not be allowed to participate in Government procurement in India for all the items related to that nodal Ministry/Department, except for the list of items published by the Ministry/Department permitting their participation.
 - iii. The stipulation in (ii) above shall be part of all tenders invited by the Central Government procuring entities stated in (i) above. All purchase on GeM shall also necessarily have the above provisions for items identified by nodal Ministry/Department.
 - iv. State Governments should be encouraged to incorporate similar provisions in their respective tenders.
 - v. The term 'entity' of a country shall have the same meaning as under the FDI Policy of DPIIT as amended from time to time.
 - e. Specifying foreign certification/ unreasonable technical specifications/ brands/ models in the bid document is restrictive and discriminatory practice against local

suppliers. If foreign certification is required to be stipulated because of non-availability of Indian Standards and/ or for any other reason, the same shall be done only after written approval of Secretary of Department concerned or any other authority having been designated such power by the Secretary of the Department concerned.

- f. "All administrative Ministries/Departments whose procurement exceeds Rs. 1000 Crore per annum shall notify/ update their procurement projections every year, including those of PSEs/PSUs, for the next 5 years on their respective website."

Annexure-I

Sl. No.	Electrical Equipment for Generation, Transmission and Distribution sectors with sufficient local capacity and competition	Class-I Local Supplier (Minimum Local Content (%))
(A) Common items for Transmission, Distribution and Generation Sector		
1	Power Transformers (up to 765 kV, including Generator transformers)	60
2	Instrument Transformer (up to 765 kV)	60
3	Transformer Oil Dry Out System (TODOS)	60
4	Reactors up to 765 kV	60
5	Oil Impregnated Bushing (up to 400 kV)	60
6	Resin Insulated Paper (RIP) bushings (up to 145 kV)	50
7	Circuit Breakers (up to 765 kV AC - Alternating Current)	60
8	Disconnectors/Isolators (up to 765 kV AC)	60
9	Wave trap (up to 765 kV AC)	60
10	Oil Filled Distribution Transformers up to & including 33 kV [Cold Rolled Grain Oriented (CRGO)/Amorphous, Aluminium/Copper wound]	60
11	Dry Type Distribution Transformer upto and including 33 kV (CRGO/Amorphous, Aluminium/Copper wound)	60
12	Conventional Conductor	60
13	Accessories for Conventional conductors	60
14	High Temperature/High Temperature Low Sag (HTLS) conductors (such as Composite core, GAP, ACSS, INVAR, AL59) and Accessories	60
15	Optical ground wire (OPGW) – all designs	60
16	Fiber Optic Terminal Equipment (FOTE) for OPGW	50
17	OPGW related Hardware and Accessories	60
18	Remote Terminal Unit (RTU)	50
19	Power Cables and accessories up to 33 kV	60
20	Control cables including accessories	60
21	XLPE Cables up to 220 kV	60
22	Substation Structures	60
23	Transmission Line Towers	60
24	Porcelain (Disc/Long Rod) Insulators	60
25	Bus Post Insulators (Porcelain)	60
26	Porcelain Disc Insulators with Room Temperature Vulcanisation (RTV) coating	50
27	Porcelain Longrod Insulators with Room Temperature Vulcanisation (RTV) coating	50
28	Hardware Fittings for Porcelain Insulators	60
29	Composite/Polymeric Long Rod Insulators	60
30	Hardware Fittings for Polymer Insulators	60
31	Bird Flight Diverter (BFD)	60
32	Power Line Carrier Communication (PLCC) System (up to 800 kV)	60
33	Gas Insulated Switchgear (up to 400 kV AC)	60
34	Gas Insulated Switchgear (above 400 kV AC)	50
35	Surge/Lightning Arrester (up to 765 kV AC)	60
36	Power Capacitors	60
37	Packaged Sub-station (6.6 kV to 33 kV)	60
38	Ring Main Unit (RMU) (up to 33 kV)	60
39	Medium Voltage (MV) GIS Panels (up to 33 kV)	60
40	Automation and Control System/Supervisory Control and data Acquisition (SCADA) System in Power System	50
41	Control and Relay Panel (including Digital/Numerical Relays)	50
42	Electrical Motors 0.37 kW to 1 MW	60
43	Energy Meters excluding smart meters	50
44	Control & power cables and Accessories (up to 1.1 kV)	60
45	Diesel Generating (DG) set	60

Sl. No.	Electrical Equipment for Generation, Transmission and Distribution sectors with sufficient local capacity and competition	Class-I Local Supplier (Minimum Local Content (%))
46	DC system (DC Battery & Battery Charger)	60
47	AC & DC Distribution Board	60
48	Indoor Air Insulated Switchgear (AIS) upto 33 kV	60
49	Poles (PCC, PSCC, Rolled Steel Joist, Rail Pole, Spun, Steel Tubular)	60
50	Material for Grounding/earthing system	60
51	Illumination system	60
52	Overhead Fault Sensing Indicator (FSI)	50
53	Power Quality Meters	50
54	Auxiliary Relays	50
55	Load Break Switch	50
	(B) Hydro Sector	
56	Hydro Turbine & Associated equipment	
	a) Francis Turbine	60
	b) Kaplan Turbine	60
	c) Pelton Turbine	50
57	Main Inlet Valve & Associated Equipment	60
58	Penstock Protection Valve and Associated Equipment	60
59	Governing system & Accessories	60
60	Generator for Hydro Project & Associated Equipment	60
61	Static Excitation System	60
62	Workshop Equipment	60
63	Cooling Water System	60
64	Compressed Air System	60
65	Drainage/Dewatering System	60
66	Fire Protection System	60
67	Heating, Ventilation & Air Conditioning System (HVAC)	60
68	Oil Handling System	60
69	Mechanical Balance of Plant (BOP) Items	60
	(C) Thermal Sector	
	Boiler Auxiliaries	
70	Air Pre-Heater	60
71	Steam Coil Air Pre Heater (SCAPH)	60
72	Steam soot blowers [wall blowers & Long Retractable Soot Blower (LRSB)]	60
73	Auxiliary Steam Pressure Reducing & Desuperheating (PRDS)	60
74	Fuel oil system	60
75	Seal air Fan	60
76	Ducts and dampers	60
77	Duct expansion joints	60
78	Blowdown tanks	60
79	Coal burners and oil burners	60
80	Coal mills	60
81	Gear Box of Coal Mill	50
82	Coal feeders	60
83	Primary Air Fans	60
84	Forced Draft Fans	60
85	Induced Draft Fans	60
86	Forced Draft (FD)/Induced Draft (ID)/ Primary Air (PA) Fan Servo Motor Assembly	50
87	Tubes (Carbon Steel)	50
88	Steam pipes (Carbon Steel)	50
89	Steam drum	50
90	Separator	50
91	Selective Catalytic Reduction (SCR)	50

Sl. No.	Electrical Equipment for Generation, Transmission and Distribution sectors with sufficient local capacity and competition	Class-I Local Supplier (Minimum Local Content (%))
	Electro-Static Precipitators (ESPs)	
92	Casing	60
93	Electrodes	60
94	Rapping System	60
95	Hopper Heaters	60
96	Transformer Rectifiers	60
97	Insulators	60
	Turbine & Auxiliaries	
98	Turbine (High Pressure/Intermediate Pressure/Low Pressure)	50
99	Condensate Extraction Pumps	60
100	Condenser On line Tube Cleaning System (COLTC)	60
101	Debris filters	60
102	Deaerator	60
103	Drain Cooler and Flash Tank	60
104	ECW Pump	50
105	Plate Heat Exchanger	50
106	Self- cleaning filters	50
107	Condensate Polishing Units (CPUs)	60
108	Chemical Dosing System	60
109	Oil Filter	60
110	Gland Steam Condenser	60
111	Oil Purifying Centrifuge	50
112	Water Cooled Condenser	50
113	Boiler Feed Pumps (BFPs)	50
	Generator and Auxiliaries	
114	Generator (including Seal Oil System, Hydrogen Cooling System, Stator water cooling system)	60
	Electrical Works	
115	Control and metering equipment	60
	Control & Instrumentation System (C&I System)	
116	Thermocouples	50
117	Measuring instruments [Resistance Temperature Detectors (RTDs)], Local gauges	50
118	Actuators (Pneumatic and conventional electric)	50
119	Interplant Communication/ Public Address (PA) system except IP based	50
	Coal Handling Plant	
120	Conveyors	60
121	Wagon Tippler	60
122	Side Arm Charger	60
123	Paddle feeder	60
124	Crushers & Screens	60
125	Dust suppression (dry fog & plain water) system	60
126	Air Compressors	50
127	Magnetic separators & metal detectors	50
128	Coal Sampling System	60
129	Stacker cum reclaimer	60
130	Belt weighing & monitoring system.	60
131	Wheel & axle assembly (without bearings) for Bottom Opening Bottom Release (BOBR) Wagons	60
	Ash Handling System	
132	Clinker grinder	60
133	Water jet ejectors	60
134	Scraper chain conveyor	60
135	Dry fly ash vacuum extraction system	60
136	Pressure pneumatic conveying system	60

Sl. No.	Electrical Equipment for Generation, Transmission and Distribution sectors with sufficient local capacity and competition	Class-I Local Supplier (Minimum Local Content (%))
137	Ash water & ash slurry pumps	60
138	Compressors, air dryers & air receivers	50
139	Ash water recovery system	60
	Raw Water Intake & Supply System	
140	Travelling water screens	60
141	Raw water supply pumps	60
142	Valves, RE joints etc.	60
	Water Treatment System and Effluent Treatment System	
143	Clarification plant	60
144	Filtration plant	60
145	Ultra filtration plant	50
146	Reverse Osmosis (RO) plant and its membrane	55
147	De-Mineralised water plant (DM Plant)	60
148	Chlorination plant	60
149	Chemical dosing system	60
150	Effluent Treatment Plant	60
	Circulating Water (CW) & Auxiliary Circulating Water (ACW) System	
151	CW & ACW Pumps	60
152	Butter Fly (BF) valves, Non-return Valves (NRVs) etc.	60
153	Rubber Expansion (RE) joints	60
154	Air release valves	60
	Cooling Towers (NDCT/ IDCT)-Natural-Draft and Induced Draft Cooling Tower	
155	Water Distribution System	60
156	Spray nozzles	60
157	Packing	60
158	Drift eliminators	60
159	Cooling Tower (CT) Fans (for Induced Draft Cooling Towers IDCT)	60
160	Gear boxes, shafts & motors (for IDCT)	60
	Air Conditioning & Ventilation System	
161	Split & window air conditioners	60
162	Chilling/ condensing unit [upto 500 ton of refrigeration(TR)]	55
163	Air Handling Unit (AHU) and Fresh air unit	60
164	Cooling Towers	60
165	Air Washing Units (AWUs), axial fans, roof extractors	60
166	Ducts, louvers & dampers	60
	Flue Gas Desulphurization (FGD)	
167	Spray Nozzles,	50
168	Spray header	50
169	Oxidation Blowers	50
170	Limestone wet Ball Mill	50
171	Slurry Handling Pumps for FGD system	50
172	Booster Fans for FGD system	50
173	Carbon Steel Ducts and Dampers for FGD	60
174	Storage Tanks and Silos	60
175	Process Water Pump for FGD system	50
	(D) Other Common Items	
	Fire protection and detection system	
176	Motor driven fire water pumps	60
177	Diesel engine driven fire water pumps	60
178	Hydrant system for the power plant.	60
179	High velocity water spray system	60
180	Medium velocity water spray system	60
181	Foam protection system	60
182	Inert gas flooding system	60

Sl. No.	Electrical Equipment for Generation, Transmission and Distribution sectors with sufficient local capacity and competition	Class-I Local Supplier (Minimum Local Content (%))
183	Fire tenders	60
184	Portable fire-extinguishers	60
185	Cranes, EOT cranes, gantry crane & chain pulley blocks etc.	60
186	Elevator	60

(E) Minimum Local Content percentages in Engineering, Procurement & Construction (EPC) / Turnkey project

In case the contract is awarded through the EPC route, the contractor should comply with the requirement of MLC for individual items as listed in Annexure-I and should purchase these items only from Class-I Local supplier. In addition, MLC for complete EPC project may also be prescribed as below:

	(1) Package Based Works	Minimum Local Content (%)
1	Boiler	60
2	TG System (Water Cooled Condenser)	60
3	Ash Handling Plant	60
4	Coal Handling Plant	60
5	Electro-static Precipitator (ESP)	60
6	Circulating Water (CW) System	60
7	Cooling Tower	60
8	Water Treatment System	60
9	Air Conditioning System (below 500TR)	60
10	Flue Gas Desulphurisation (FGD) System	60
11	Station Control & Instrumentation (C&I)	50
12	Hydro Power Projects (Electro-Mechanical Works)	60
	Gas based generation	
	Overall Gas Turbine Package (on finished Product basis)	
13	< 44 MW	60
14	44 – 145 MW	50
	Overall Combined Cycle Gas Turbine (CCGT) Package (on finished Product basis)	
15	< 44 MW	60
16	44 – 145 MW	60
17	> 150 MW	60
	(2) Project as a whole	
1	Works and service contracts in Power Sector	60
2	Transmission Line with Conventional conductors (ACSR, AAAC, AL-59 etc.)	60
3	Transmission Line with High temperature Low Sag (HTLS) conductors	60
4	HVAC Substation Air Insulated (AIS)	60
5	HVAC Substation Gas Insulated (GIS)	60
6	HVDC Substation	60
7	Distribution Sector	60

Annexure-II

General guidelines to be adopted selectively in an appropriate manner by the procuring entities in their tender documents.

1. The bidder shall have to be an entity registered in India in accordance with law.
2. The bids shall be in the language as prescribed by the tenderer/procurer.
3. The bids shall be in Indian Rupees (INR) (in respect of local content only).
4. Indian subsidiaries of foreign bidders shall have to meet the qualifying criteria in terms of capability, competency, financial position, past performance etc.
5. The bidder shall follow Indian laws, regulations and standards.
6. To be eligible for participation in the bid, foreign bidders shall compulsorily set up their manufacturing units on a long term basis in India as may be specified by the tenderer/ procurer.
7. Similar or better technology than the technology offered in respect of material, equipment and process involved shall be transferred to India. Along with the transfer of technology, adequate training in the respective field shall also be provided.
8. Country of origin of the equipment/material shall be provided in the bid.
9. For supply of equipment / material from the country of origin other than India, the bidder shall submit performance certificate in support of satisfactory operation in India or a country other than the country of origin having climatic and operational conditions including ambient temperature similar to that of India for more than _____ years (to be specified by the procurer).
10. The technologies/ products offered shall be environmental friendly, consuming less energy, safe, energy efficient, durable and long lasting under the prescribed operational conditions.
11. The supplier shall ensure supply of spares, materials and technological support for the entire life of the project.
12. The manufacturers/ supplier shall list out the products and components producing Toxic E-waste and other waste as may be specified. It shall have an Extended Producers Responsibility (EPR) so that after the completion of the lifecycle, the materials are safely recycled / disposed of by the Manufacturer/ supplier and for this, the Manufacturer/supplier along with procurer has to establish recycling / disposal unit or as may be specified.
13. Minimum Local Content requirement for goods, services or works shall be in accordance with the conditions laid down in respective Order(s) of the sectors on Public Procurement (Preference to Make in India) to provide for purchase preference (linked with local content).

14. The equipment/ material sourced from foreign companies may be tested in accredited labs in India before acceptance wherever such facilities are available.
15. The Tender fee and the Bank Guarantee (BG) shall be in Indian Rupees only.
16. The bidder shall have to furnish a certificate regarding cyber security/safety of the equipment/process to be supplied/services to be rendered as safe to connect.
17. Applicable safety requirements shall be met. Regular safety audit shall be carried out by the manufacturer/ supplier.
18. Statutory laws/regulations including the labour and environmental laws shall be strictly complied with during supply, storage, erection, commissioning and operation process. A regular compliance report shall be submitted to the procurer/appropriate Authorities.
19. Formation of new joint venture in India shall be permitted only with the Indian companies.
20. Tendering by the agent shall not be accepted.
21. In case local testing is not considered necessary by the procurer, the original test report in the language prescribed by the procurer may be accepted. The translated test report shall not be accepted unless it is notarised.
22. Certification/compliance as per the Indian Standards/ International Standards/ Indian Regulations/ specified Standards shall be mandatory, where ever applicable.
23. Quality assurance of the product shall be carried out by the procurer or an independent third party agency appointed by the procurer. Manufacturing Quality Plan as approved by the procurer shall be followed by the manufacturer/supplier.
24. Wherever required by the procurer, foreign supplier shall establish fully functional service centers in India and shall keep spares/material locally for future needs of utilities.
25. Arbitration proceedings shall be instituted in India only and all disputes shall be settled as per applicable Indian Laws.

No. P-45021/2/2017-PP (BE-II)-Part(4)Vol.II
Government of India
Ministry of Commerce and Industry
Department for Promotion of Industry and Internal Trade
(Public Procurement Section)

Vanija Bhawan, New Delhi
Dated: 19 July, 2024

To

All Central Ministries/Departments/CPSUs/All concerned

ORDER

**Subject: Public Procurement (Preference to Make in India), Order 2017–
Revision; regarding.**

Department for Promotion of Industry and Internal Trade, in partial modification [Paras 2, 3, 5, 10 & 13] of Order No.P-45021/2/2017-B.E.-II dated 15.6.2017 as amended by Order No.P-45021/2/2017-B.E.-II dated 28.05.2018, Order No.P-45021/2/2017-B.E.-II dated 29.05.2019, Order No.P-45021/2/2017-B.E.-II dated 04.06.2020 and Order No.P-45021/2/2017-B.E.-II dated 16.09.2020 hereby Issues the revised 'Public Procurement (Preference to Make in India), Order 2017' dated 19.07.2024 effective with immediate effect.

Whereas it is the policy of the Government of India to encourage 'Make in India' and promote manufacturing and production of goods and services in India with a view to enhancing income and employment, and

Whereas procurement by the Government is substantial in amount and can contribute towards this policy objective, and

Whereas local content can be increased through partnerships, cooperation with local companies, establishing production units in India or Joint Ventures (JV) with Indian suppliers, increasing the participation of local employees in services and training them,

Now therefore the following Order is issued:

1. This Order is issued pursuant to Rule 153 (iii) of the General Financial Rules 2017.
2. **Definitions:** For the purposes of this Order:
'Local content' means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.

Explanatory notes for calculation of local content given above

- a. Imported items sourced locally from resellers/distributors shall be excluded from calculation of local content.
- b. The license fees/royalties paid/ technical charges paid out of India shall be excluded from local content calculation.

- c. Procurement/Supply of repackaged/refurbished/rebranded imported products as understood commonly shall be treated as reselling of imported products and shall be excluded from calculation of local content. The definition of repackaged/refurbished/rebranded imported products is as follows;

'Refurbishing' means repair or reconditioning of an imported product does not amount to manufacture because no new goods come into existence.

'Repackaging' means repacking of imported goods from bulk pack to smaller packs would not ordinarily amount to manufacture of a new item.

'Rebranding' means relabeling or renaming or change in symbol or logo/makes or corporate image of a company/organization/ firm for an imported product would amount to rebranding.

- d. To ensure that imported items sourced locally from resellers/distributors are excluded from calculation of local content, procuring entities to obtain from bidders, the cost of such locally-sourced imported items (Inclusive of taxes) along with break-up on license/royalties paid/technical expertise cost etc. sourced from outside India. For items sold by bidder as reseller, OEM certificate for country of origin to be submitted.
- e. For contracts involving supply of multiple items, weighted average of all items to be taken while calculating the local content.

'Class-I local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-I local supplier' under this Order.

'Class-II local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-II local supplier' but less than that prescribed for 'Class-I local supplier' under this Order.

'Non - Local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, has local content less than that prescribed for 'Class-II local supplier' under this Order.

'L1' means the lowest tender or lowest bid or the lowest quotation received in a tender, bidding process or other procurement solicitation as adjudged in the evaluation process as per the tender or other procurement solicitation.

'Margin of purchase preference' means the maximum extent to which the price quoted by a "Class-I local supplier" may be above the L1 for the purpose of purchase preference.

'Nodal Ministry' means the Ministry or Department identified pursuant to this order in respect of a particular item of goods or services or works.

'Procuring entity' means a Ministry or department or attached or subordinate office of, or autonomous body controlled by, the Government of India and includes Government companies as defined in the Companies Act.

'Works' means all works as per Rule 130 of GFR- 2017, and will also include 'turnkey works'.

2A. Special treatment for items covered under PLI Scheme

The manufacturers manufacturing an item under PLI scheme shall be treated as deemed Class II local supplier for that item unless they have minimum local content equal to or higher than that notified for Class-I local supplier for that item, provided the manufacturer has received incentive from the concerned PLI Ministry for the item. The above shall be applicable for the specific time period only, as notified by concerned PLI Ministry.

3. Eligibility of 'Class-I local supplier'/ 'Class-II local supplier'/ 'Non-local suppliers' for different types of procurement

(a) In procurement of all goods, services or works in respect of which the Nodal Ministry / Department has communicated that there is sufficient local capacity and local competition, only 'Class-I local supplier', as defined under the Order, shall be eligible to bid irrespective of purchase value.

(b) Only 'Class-I local supplier' and 'Class-II local supplier', as defined under the Order, shall be eligible to bid in procurement undertaken by procuring entities, except when Global tender enquiry has been issued. In global tender enquiries, 'Non-local suppliers' shall also be eligible to bid along with 'Class-I local suppliers' and 'Class-II local suppliers'. In procurement of all goods, services or works, not covered by sub-para 3(a) above, and with estimated value of purchases less than Rs. 200 Crore, in accordance with Rule 161(iv) of GFR, 2017, Global tender enquiry shall not be issued except with the approval of competent authority as designated by Department of Expenditure.

(c) For the purpose of this Order, works includes Engineering, Procurement and Construction (EPC) contracts and services include System Integrator (SI) contracts.

3.1 Mandatory sourcing of items, with sufficient local capacity and competition, from Class-I local suppliers in SI/EPC/Turnkey Contracts/Service Tenders

- a. The items, notified as having sufficient local capacity and competition, shall mandatory be sourced from Class-I local suppliers in SI/EPC/Turnkey Contracts/ Services tenders. This provision will be applicable only for those items which have been notified by the Nodal Ministry as Class I i.e. having sufficient local capacity and competition, with specific HSN codes."
- b. Notwithstanding above, if in any project, it is considered that it is not practically feasible to source such items from Class I local suppliers, it may take relaxation from such stipulation with the approval of Secretary of the administrative Ministry/ Department concerned or with the approval of the Competent Authority specified by the Administrative Ministry/Department, on case-specific basis.

3A. Purchase Preference

(a) Subject to the provisions of this Order and to any specific instructions issued by the Nodal Ministry or in pursuance of this Order, purchase preference shall be given to 'Class-I local supplier' in procurement undertaken by procuring entities in the manner specified here under.

(b) In the procurement of goods or works, which are covered by para 3(b)

above and which are divisible in nature, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

- i. Among all qualified bids, the lowest bid will be termed as L1. If L1 is 'Class-I local supplier', the contract for full quantity will be awarded to L1.
 - ii. If L1 bid is not a 'Class-I local supplier', 50% of the order quantity shall be awarded to L1. Thereafter, the lowest bidder among the 'Class-I local supplier' will be invited to match the L1 price for the remaining 50% quantity subject to the Class-I local supplier's quoted price falling within the margin of purchase preference, and contract for that quantity shall be awarded to such 'Class-I local supplier' subject to matching the L1 price. In case such lowest eligible 'Class-I local supplier' fails to match the L1 price or accepts less than the offered quantity, the next higher 'Class-I local supplier' within the margin of purchase preference shall be invited to match the L1 price for remaining quantity and so on, and contract shall be awarded accordingly. In case some quantity is still left uncovered on Class-I local suppliers, then such balance quantity may also be ordered on the L1 bidder.
- (c) In the procurement of goods or works, which are covered by para 3(b) above and which are not divisible in nature, and in procurement of services where the bid is evaluated on price alone, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:
- i. Among all qualified bids, the lowest bid will be termed as L1. If L1 is Class -I local supplier', the contract will be awarded to L1.
 - ii. If L1 is not 'Class-I local supplier', the lowest bidder among the 'Class-I local supplier', will be invited to match the L1 price subject to Class-I local supplier's quoted price falling within the margin of purchase preference, and the contract shall be awarded to such 'Class-I local supplier' subject to matching the L1 price.
 - iii. In case such lowest eligible 'Class-I local supplier' fails to match the L1 price, the 'Class-I local supplier' with the next higher bid within the margin of purchase preference shall be invited to match the L1 price and so on and contract shall be awarded accordingly. In case none of the 'Class-I local supplier' within the margin of purchase preference matches the L1 price, the contract may be awarded to the L1 bidder.
- (d) "Class-II local supplier" will not get purchase preference in any procurement, undertaken by procuring entities.

3B. Applicability in tenders where contract is to be awarded to multiple bidders- In tenders where contract is awarded to multiple bidders subject to matching of L1 rates or otherwise, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

- a. In case there is sufficient local capacity and competition for the item to be procured, as notified by the nodal Ministry, only Class I local suppliers shall be eligible to bid. As such, the multiple suppliers, who would be awarded the contract, should be all and only 'Class I Local suppliers'.
- b. In other cases, 'Class II local suppliers' and 'Non local suppliers' may also participate in the bidding process along with 'Class I Local suppliers' as per provisions of this Order.
- c. If 'Class I Local suppliers' qualify for award of contract for at least



50% of the tendered quantity in any tender, the contract may be awarded to all the qualified bidders as per award criteria stipulated in the bid documents. However, in case 'Class I Local suppliers' do not qualify for award of contract for at least 50% of the tendered quantity, purchase preference should be given to the 'Class I local supplier' over 'Class II local suppliers'/ 'Non local suppliers' provided that their quoted rate falls within 20% margin of purchase preference of the highest quoted bidder considered for award of contract so as to ensure that the 'Class I Local suppliers' taken in totality are considered for award of contract for at least 50% of the tendered quantity.

- d. First purchase preference has to be given to the lowest quoting 'Class-I local supplier', whose quoted rates fall within 20% margin of purchase preference, subject to its meeting the prescribed criteria for award of contract as also the constraint of maximum quantity that can be sourced from any single supplier. If the lowest quoting 'Class-I local supplier', does not qualify for purchase preference because of aforesaid constraints or does not accept the offered quantity, an opportunity may be given to next higher 'Class-I local supplier', falling within 20% margin of purchase preference, and so on.
 - e. To avoid any ambiguity during bid evaluation process, the procuring entities may stipulate its own tender specific criteria for award of contract amongst different bidders including the procedure for purchase preference to 'Class-I local supplier' within the broad policy guidelines stipulated in sub- paras above.
4. **Exemption of small purchases:** Notwithstanding anything contained in paragraph 3, procurement where the estimated value to be procured is less than Rs. 5 lakhs shall be exempt from this Order. However, it shall be ensured by procuring entities that procurement is not split for the purpose of avoiding the provisions of this Order.

4A. Exemption in sourcing of spares and consumables of closed systems:

Procurement of spare parts, consumables for closed systems and Maintenance/ Service contracts with Original Equipment Manufacturer/Original Equipment Supplier/Original Part Manufacturer shall be exempted from this Order.

5. **Minimum local content:** The 'local content' requirement to categorize a supplier as 'Class-I local supplier' is minimum 50%. For 'Class-II local supplier', the 'local content' requirement is minimum 20%. Nodal Ministry/ Department may prescribe only a higher percentage of minimum local content requirement to categorize a supplier as 'Class-I local supplier'/ 'Class- II local supplier'. For the items, for which Nodal Ministry/ Department has not prescribed higher minimum local content notification under the Order, it shall be 50% and 20% for 'Class-I local supplier'/ 'Class-II local supplier' respectively.
6. **Margin of Purchase Preference:** The margin of purchase preference shall be 20%.
7. **Requirement for specification in advance:** The minimum local content, the margin of purchase preference and the procedure for preference to Make in India shall be specified in the notice inviting tenders or other form of procurement solicitation and shall not be varied during a particular procurement transaction.
8. **Government E-marketplace:** In respect of procurement through the Government E-marketplace (GeM) shall, as far as possible, specifically mark the items which meet the minimum local content while registering the item for

display, and shall, wherever feasible, make provision for automated comparison with purchase preference and without purchase preference and for obtaining consent of the local supplier in those cases where purchase preference is to be exercised.

9. Verification of local content:

- a. The 'Class-I local supplier'/ 'Class-II local supplier' at the time of tender, bidding or solicitation shall be required to indicate percentage of local content and provide self-certification that the item offered meets the local content requirement for 'Class-I local supplier'/ 'Class-II local supplier', as the case may be. They shall also give details of the location(s) at which the local value addition is made.
- b. In cases of procurement for a value in excess of Rs. 10 crores, the 'Class-I local supplier'/ 'Class-II local supplier' shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.
- c. The bidder shall give self-certification for local content in the quoted item (goods/works/services) at the time of tendering. However, at the time of execution of the project, for all contracts above INR 10 Crore, the contractor/ supplier shall be required to give local content certification duly certified by cost/ chartered accountant in practice. For cases where it is not possible to provide certification by Cost/Chartered Accountant at the time of execution of project, the supplier shall be permitted to provide the certificate for local content from Cost/ Chartered Accountant after completion of the contract, within time limit acceptable to the procuring entity. In case the contractor/ supplier does not meet the stipulated local content requirement and the category of the supplier changes from Class-I to Class-II/ Non-local or from Class-II to Non-local, a penalty upto 10% of the contract value may be imposed. However, contract once awarded shall not be terminated on this account.
- d. Decisions on complaints relating to implementation of this Order shall be taken by the competent authority which is empowered to look into procurement-related complaints relating to the procuring entity.
- e. Nodal Ministries may constitute committees with internal and external experts for independent verification of self-declarations and auditor's/ accountant's certificates on random basis and in the case of complaints.
- f. Nodal Ministries and procuring entities may prescribe fees for such complaints.
- g. False declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.
- h. A supplier who has been debarred by any procuring entity for violation of this Order shall not be eligible for preference under this Order for procurement by any other procuring entity for the duration of the debarment. The debarment for such other procuring entities shall take effect prospectively from the date on which it comes to the notice of other procurement entities, in the manner prescribed under paragraph 9

i below.

- i. The Department of Expenditure shall issue suitable instructions for the effective and smooth operation of this process, so that:
 - i. The fact and duration of debarment for violation of this Order by any procuring entity are promptly brought to the notice of the Member-Convenor of the Standing Committee and the Department of Expenditure through the concerned Ministry /Department or in some other manner;
 - ii. On a periodical basis such cases are consolidated and a centralized list or decentralized lists of such suppliers with the period of debarment is maintained and displayed on website(s);
 - iii. In respect of procuring entities other than the one which has carried out the debarment, the debarment takes effect prospectively from the date of uploading on the website(s) in the such a manner that ongoing procurement are not disrupted.

10. Specifications in Tenders and other procurement solicitations:

- a. Every procuring entity shall ensure that the eligibility conditions in respect of previous experience fixed in any tender or solicitation do not require proof of supply in other countries or proof of exports.
- b. Procuring entities shall endeavour to see that eligibility conditions, including on matters like turnover, production capability and financial strength do not result in unreasonable exclusion of 'Class-I local supplier'/ 'Class-II local supplier' who would otherwise be eligible, beyond what is essential for ensuring quality or creditworthiness of the supplier.
- c. Procuring entities shall, within 2 months of the issue of this Order review all existing eligibility norms and conditions with reference to sub-paragraphs 'a' and 'b' above.
- d. **Reciprocity Clause**
 - i. When a Nodal Ministry/Department identifies that Indian suppliers of an item are not allowed to participate and/ or compete in procurement by any foreign government, due to restrictive tender conditions which have direct or indirect effect of barring Indian companies such as registration in the procuring country, execution of projects of specific value in the procuring country etc., it shall provide such details to all its procuring entities including CMDs/CEOs of PSEs/PSUs, State Governments and other procurement agencies under their administrative control and GeM for appropriate reciprocal action.
 - ii. Entities of countries which have been identified by the nodal Ministry/Department as not allowing Indian companies to participate in their Government procurement for any item related to that nodal Ministry shall not be allowed to participate in Government procurement in India for all items related to that nodal Ministry/ Department, except for the list of items published by the Ministry/ Department permitting their participation.
 - iii. The stipulation in (ii) above shall be part of all tenders invited by the Central Government procuring entities stated in (i) above. All purchases on GeM shall also necessarily have the above provisions for items identified by nodal Ministry/ Department.
 - iv. State Governments should be encouraged to incorporate similar provisions in their respective tenders.
 - v. The term 'entity' of a country shall have the same meaning as under the FDI Policy of DPIIT as amended from time to time.
- e. Specifying foreign certifications/ unreasonable technical specifications/



brands/ models in the bid document is restrictive and discriminatory practice against local suppliers. If foreign certification is required to be stipulated because of non-availability of Indian Standards and/or for any other reason, the same shall be done only after written approval of Secretary of the Department concerned or any other Authority having been designated such power by the Secretary of the Department concerned.

- f. "All administrative Ministries/Departments whose procurement exceeds Rs. 1000 Crore per annum shall notify/update their procurement projections every year, including those of the PSEs/PSUs, for the next 5 years on their respective website."

10A. Action for non-compliance of the Provisions of the Order: In case restrictive or discriminatory conditions against domestic suppliers are included in bid documents, an inquiry shall be conducted by the Administrative Department undertaking the procurement (including procurement by any entity under its administrative control) to fix responsibility for the same. Thereafter, appropriate action, administrative or otherwise, shall be taken against erring officials of procurement entities under relevant provisions. Intimation on all such actions shall be sent to the Standing Committee.

11. **Assessment of supply base by Nodal Ministries:** The Nodal Ministry shall keep in view the domestic manufacturing / supply base and assess the available capacity and the extent of local competition while identifying items and prescribing the higher minimum local content or the manner of its calculation, with a view to avoiding cost increase from the operation of this Order.
12. **Increase in minimum local content:** The Nodal Ministry may annually review the local content requirements with a view to increasing them, subject to availability of sufficient local competition with adequate quality.
13. **Manufacture under license/ technology collaboration agreements with phased indigenization:** While notifying the minimum local content, Nodal Ministries may make special provisions for exempting suppliers from meeting the stipulated local content if the product is being manufactured in India under a license from a foreign manufacturer who holds intellectual property rights and where there is a technology collaboration agreement / transfer of technology agreement for indigenous manufacture of a product developed abroad with clear phasing of increase in local content.

13A. In procurement of all goods, services or works in respect of which there is substantial quantity of public procurement and for which the nodal ministry has not notified that there is sufficient local capacity and local competition, the concerned nodal ministry shall notify an upper threshold value of procurement beyond which foreign companies shall enter into a joint venture with an Indian company to participate in the tender. Procuring entities, while procuring such items beyond the notified threshold value, shall prescribe in their respective tenders that foreign companies may enter into a joint venture with an Indian company to participate in the tender. The procuring Ministries/Departments shall also make special provisions for exempting such joint ventures from meeting the stipulated minimum local content requirement, which shall be increased in a phased manner.

14. **Powers to grant exemption and to reduce minimum local content:** The administrative Department undertaking the procurement (including

procurement by any entity under its administrative control), with the approval of their Minister-in-charge, may by written order, for reasons to be recorded in writing,

- a. reduce the minimum local content below the prescribed level; or
- b. reduce the margin of purchase preference below 20%; or
- c. exempt any particular item or supplying entities from the operation of this Order or any part of the Order.

The Administrative Department, while seeking exemption under this para, shall certify that such an item(s) has not been notified by Nodal Ministry/ Department concerned under para 3 (a) of the Order.

A copy of every such order shall be provided to the Standing Committee and concerned Nodal Ministry / Department. The Nodal Ministry / Department concerned will continue to have the power to vary its notification on Minimum Local Content.

- 15. **Directions to Government companies:** In respect of Government companies and other procuring entities not governed by the General Financial Rules, the administrative Ministry or Department shall issue policy directions requiring compliance with this Order.
- 16. **Standing Committee:** A standing committee is hereby constituted with the following membership:
 Secretary, Department for Promotion of Industry and Internal Trade - Chairman
 Secretary, Commerce—Member
 Secretary, Ministry of Electronics and Information Technology—Member Joint
 Secretary (Public Procurement), Department of Expenditure—Member Joint
 Secretary (DPIIT)—Member-Convenor

The Secretary of the Department concerned with a particular item shall be a member in respect of issues relating to such item. The Chairman of the Committee may co-opt technical experts as relevant to any issue or class of issues under its consideration.

- 17. **Functions of the Standing Committee:** The Standing Committee shall meet as often as necessary, but not less than once in six months. The Committee
 - a. shall oversee the implementation of this order and issues arising therefrom, and make recommendations to Nodal Ministries and procuring entities.
 - b. shall annually assess and periodically monitor compliance with this Order
 - c. shall identify Nodal Ministries and the allocation of items among them for issue of notifications on minimum local content
 - d. may require furnishing of details or returns regarding compliance with this Order and related matters
 - e. may, during the annual review or otherwise, assess issues, if any, where it is felt that the manner of implementation of the order results in any restrictive practices, cartelization or increase in public expenditure and suggest remedial measures
 - f. may examine cases covered by paragraph 13 above relating to manufacture under license/ technology transfer agreements with a view to satisfying itself that adequate mechanisms exist for enforcement of such agreements and for attaining the underlying objective of progressive indigenization

- g. may consider any other issue relating to this Order which may arise.
18. **Removal of difficulties:** Ministries /Departments and the Boards of Directors of Government companies may issue such clarifications and instructions as may be necessary for the removal of any difficulties arising in the implementation of this Order.
19. **Ministries having existing policies:** Where any Ministry or Department has its own policy for preference to local content approved by the Cabinet after 1st January 2015, such policies will prevail over the provisions of this Order. All other existing orders on preference to local content shall be reviewed by the Nodal Ministries and revised as needed to conform to this Order, within two months of the issue of this Order.
20. **Transitional provision:** This Order shall not apply to any tender or procurement for which notice inviting tender or other form of procurement solicitation has been issued before the issue of this Order.



(Himani Pande)

Additional Secretary to the Government of India


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PART-A
VOLUME – VII
ERECTION CONDITIONS OF CONTRACT


CLAUSE NO.	<div>ERECTION CONDITIONS OF CONTRACT</div> <div> </div>		
1.00.00 1.01.00 1.02.00	<div>GENERAL</div> <p>The following provisions shall supplement the conditions already contained in the other parts of these specifications and documents and shall govern that portion of the work of this contract which is to be performed at site. The erection requirements and procedures not specified in these documents shall be in accordance with the recommendations of the equipment manufacturer, or as mutually agreed to between the Employer and the Contractor prior to commencement of erection work.</p> <p>The Contractor upon signing of the Contract shall in addition to a Project Co-ordinator, nominate another responsible officer as his representative at Site suitably designated for the purpose of overall responsibility and co-ordination of the Works to be performed at Site. Such a person shall function from the Site office of the Contractor during the pendency of Contract.</p> <div>REGULATION OF LOCAL AUTHORITIES AND STATUTES</div> <p>In addition to the local laws and regulations, the Contractor shall also comply with the Minimum Wages Act and the Payment of Wages Act (both of the Government of India) and the rules made there under in respect of its labour and the labour of its sub-contractors currently employed on or connected with the contract.</p> <p>All registration and statutory inspection fees, if any, in respect of his work pursuant to this Contract shall be to the account of the Contractor. However, any registration, statutory inspection fees lawfully pay-able under the provisions of the Indian Boiler Regulations and any other statutory laws and its amendments from time to time during erection in respect of the plant equipment ultimately to be owned by the Employer, shall be to the account of the Employer. Should any such inspection or registration need to be re-arranged due to the fault of the Contractor or his Sub-Contractor, the additional fees for such inspection and/or registration shall be borne by the Contractor.</p> <div>WELDING REQUIREMENTS (AS APPLICABLE)</div> <p>The welding of all pressure parts and high pressure piping shall be in accordance with the following requirements:</p> <div>Qualification of Weld Procedures</div> <p>Only qualified welding procedures as per ASME Section IX shall be used by contractor at site. Procedure qualification records along with WPS shall be submitted to NTPC for review. Welding procedure shall indicate all essential and non-essential parameters as per ASME Section IX. Makes of welding consumables shall be subject to employer's approval.</p> <div>Welder's Qualification</div> <p>Only welders who are qualified in accordance with the latest applicable requirements of the Indian Boiler Regulations, shall be permitted to perform any welding work on the pressure parts and its attachment welding. In addition to such statutory qualification requirements, the welders shall also undergo a satisfactory pre-production qualification test to be conducted by the Contractor at site as per ASME Sec IX in presence of employer's representative(s), prior to performing work under these specifications. The services of an independent testing laboratory shall be retained by the Contractor to perform welder qualification tests for welders.</p> <p>All the welders carrying out welding at site shall carry an identification badge, which shall indicate the category and the grade of welding for which they have been tested and authorised to carry out welding.</p>		
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3.03.00	Records Welders performance shall be monitored regularly and record of their performance shall be maintained by contractor in a manner acceptable to the employer. Contractor shall maintain such records including record of procedure qualification & welder qualification and hand-over to the employer at the end of work.			
3.04.00	MARKING On completion of each welded joint, the welder shall mark his regularly assigned identification mark near the joint. The welder's identification numbers, inspection stamps or code symbol stamps and any other information shall not be directly stamped on any alloy steel piping. In alloy steel piping, all such information shall be stamped on separate marking plate which shall be tack welded on pipe near the weld.			
4.00.00	HEAT TREATMENT			
4.01.00	Pre-heating, post-heating and post-weld stress relief operations of all welds, shall be performed in accordance with the requirements of applicable code. Local post weld stress relieving heat treatments shall be adopted only in cases where it is normally impracticable to subject the entire assembly as such for stress relieving operations. Heating may be by means of electric induction coils or electric resistance coils. Oxy-acetylene flame heating or exothermic chemical heating methods will not be permitted. Complete recording of the temperatures through out the stress relieving cycle of the material and the weld subjected to heat treatment shall be made by means of a potentiometric recorder. Recorders other than those of potentiometric type shall not be used for such temperature recording during stress relieving operations. The contractor & employer's representative, at start and at the end of HT Cycle shall sign the time and temperature charts for heat-treatment.			
4.03.00	After setting up the weld joint for heat treatment operation, the Employer's signature shall be obtained on the strips chart of the recorder prior to starting of heat treatment cycle. The right hand corner of the strip chart at the starting point of the heat treatment cycle shall contain details like the weld number, material, diameter and thickness, method of heating adopted, prescribed ranges of heat treatment temperatures, date of heat treatment, reference to item number of the Field welding Schedule (as specified at clause no 7.00.00- of this chapter) etc.			
5.00.00	WELD EDGE PREPARATION Preparation at site of weld joint shall be in accordance with details acceptable to the Employer. Wherever possible, machining or automatic flame cutting shall be used for edge preparation. Hand flame cutting will be permitted only where edge preparation otherwise is impractical. All slag shall be removed from cuts and all the hand cuts shall be ground smooth to the satisfaction of the Employer. Flame cutting of alloy steel pipe shall be avoided. Wherever such cutting is done, a 200mm length at the cut face shall be removed by machining. Pneumatic hand tools such as edge preparation, tube cutting machine can be used.			
6.00.00	CLEANING AND SERVICING			
6.01.00	The inside of all tubes, pipes, valves and fittings shall be free from dirt, and loose scales before being erected. All the pipelines shall be thoroughly blown and/or flushed. A system for recording of all such operations shall be developed and maintained in a manner to ensure that no obstructions are left inside the tubes and no tubes are left uncleaned and untested.			
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6.02.00	All valves and valve actuators, and dampers and damper actuators, if any, shall be thoroughly cleaned and serviced prior to pre-commissioning tests and/or Initial Operations of the plant. A system for recording of such servicing operation shall be developed and maintained in a manner acceptable to the Employer and to ensure that no valves or dampers including their actuators are left unserviced.		
6.03.00	All surfaces of the engine shall be thoroughly cleaned prior to boxing - up to remove all traces of oil preservations.		
7.00.00	<p>FIELD WELDING SCHEDULE</p> <p>The Contractor shall submit to the Employer, a certified and complete field welding schedule for all the field welding activities to be carried out in respect of the pressure parts involved in the equipment furnished and erected by him, at least 90 days prior to the scheduled start of erection work at site. Such schedule will be strictly followed by the Contractor during the process of erection. The above field-welding schedule to be issued by the Contractor shall contain the following:</p> <ul style="list-style-type: none"> (a.) Drawing No (s) (b.) Location of the weld (c.) Size of the weld (outside diameter and thickness) (d.) Type of joints (e.) Material specifications (f.) Size of fillet on backing ring, when the type of joint is with backing ring (g.) Electrode/ filler metal specifications (h.) Number of welds per unit (i.) Quantity of filler metal per weld (j.) Indication of required Non-destructive Examination (NDE) for each weld (k.) Pre-heat temperatures for welding (l.) Process of welding (m.) Post-welding heat treatment temperature ranges, duration, under as specified at clause no 4.00.00 of this chapter entitled "Heat Treatment". (n.) Qualification details of weld procedures to be adopted as specified at clause no 3.01.00 of this chapter entitled 'Qualification of Weld Procedures'. 		
8.00.00	<p>SITE RUN MISCELLANEOUS PIPING</p> <p>Sketches or diagrams of the proposed routings of all piping, not already indicated and routed on the shop drawings which were reviewed by the Employer, shall be submitted to the Employer for review, Employer's acceptance of such site routings shall be obtained before the piping is erected. All these site run piping shall be installed in such a manner as to present an orderly and neat installation. They shall be located as to avoid obstruction of access and passages. Valves, instruments or any other special items shall be located convenient for operation by the operating personnel. Pipe runs shall be plumb or level except</p>		
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<p>9.00.00</p> <p>10.00.00</p> <p>10.01.00</p> <p>10.02.00</p> <p>11.00.00</p> <p>11.01.00</p> <p>11.02.00</p> <p>12.00.00</p> <p>12.01.00</p>	<p>where pitch for drainage is required. Pipe runs that are not parallel to the building structure, walls or column rows shall be avoided so that deflection of pipes between hangers does not exceed 6 mm. No miscellaneous pipe shall be routed and installed above or adjacent to electrical equipment.</p> <p>THERMAL EXPANSIONS</p> <p>All piping installation shall be such that no excessive or destructive expansion forces exist either in the cold condition or under condition of maximum temperature. All bends, expansion joints and any other special fittings, necessary to provide proper expansion, shall be incorporated. During installation of expansion joints and anchors, care must be taken to make sure that full design movement is available at all times for maximum to minimum temperature and vice-versa.</p> <p>PIPING SUPPORTS</p> <p>Hangers, supports and anchors shall be installed as required to obtain a safe, reliable and complete pipe installation. All supports shall be properly levelled and anchored when installed. The anchors shall be so placed that thermal expansion will be absorbed by bends without subjecting the valves or equipment to excessive strains.</p> <p>The hanger assemblies shall not be used for the attachment of rigging to hoist the pipe into place. Other means shall be used to securely hold the pipe in place till the pipe support is completely assembled and attached to the pipe and building structures and spring support is set to accommodate the pipe way. All temporary rigging shall be removed in such a way that the pipe support is not subjected to any sudden load. All piping, having variable spring type supports, shall be held securely in place by temporary means during the hydraulic test of pipe system. Constant support type spring hangers used during hydraulic test shall be pinned or blocked solid during the test. After complete installation and insulation of the piping and filling of the piping with its normal operating medium, the pipe support springs shall be adjusted to the cold positions. If necessary, the spring support shall be re-adjusted to the hot positions after the line has been placed for service at its normal maximum operating temperature conditions. Electric arc welding only shall be used to weld all pipe supports to structural steel members that form part of the building supporting structure. The structural beams shall not be heated more than necessary during welding of supports and such welds shall run parallel to the axis of the span. All lugs or any other attachments welded to the piping shall be of the same material as the pipe.</p> <p>PRESSURE TESTING</p> <p>On completion of erection, Contractor is required to carry out hydraulic test to fulfill with the Statutory requirements. It is contractor responsibility to identify & fulfill all the statutory requirements.</p> <p>All blank flanges or any removable plugs required for openings not closed by the valves, and piping provided, shall be furnished by the Contractor. The pressurization equipment including water piping from the supply, needed for the above test shall also be furnished by the Contractor. Any defects noticed during the testing are to be rectified and the unit re-tested. If any welding is done on the pressure parts after the Hydraulic test, the Hydraulic test for that portion of pressure parts shall be repeated.</p> <p>THERMOWELLS AND FLOW NOZZLES</p> <p>All the thermowells and flow nozzles in the equipment furnished under the technical specifications shall be installed as a part of this work.</p>			
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<p>13.00.00</p> <p>13.01.00</p> <p>13.01.01</p> <p>13.01.02</p> <p>13.01.03</p> <p>13.01.04</p>	<p>INSULATION, LAGGING AND CLADDING</p> <p>The provision of insulation, lagging and cladding of the various equipments and portion of the equipment covered under the Contract, shall be furnished by the Contractor as specified elsewhere or agree to separately in writing. Welds required for holding insulation on pressure parts shall be carried out by IBR qualified welder.</p> <p>Piping, Pipe Fittings & Valves</p> <p>All piping insulation and metal cladding furnished with the equipment to be erected shall be applied as specified herein.</p> <p>Piping</p> <p>The insulation on piping shall be applied using wire loops on 150mm centres. These wire loops shall be thoroughly embedded into the outer insulation surface and all cracks, voids and depressions shall be filled with insulating cement suitable for the piping temperature so as to form a smooth base for application of cladding. The wires used for piping insulation shall be of 16 SWG. The surface shall be smooth and uniform before applying the outer covering. All piping insulation ends shall be terminated at a sufficient distance from flanges to facilitate removal of bolts.</p> <p>Flanges</p> <p>Insulation on flanges shall be by means of blocks of insulating material securely bound to the flange by wire loops. Such blocks of insulation shall be long enough to overlap the adjacent pipe insulation by an amount equal to the thickness of adjacent pipe insulation. Smooth finish shall be obtained by the application of insulating cement. Alternatively, sectional pipe insulation of proper diameter may be used. Insulation on flanges shall not be done until the pipe and equipment have been in service during the initial operation and till all the flange bolts have been retightened.</p> <p>Bends and Elbows</p> <p>Insulation on bends and elbows shall be cut into sections sufficiently short to form a reasonable smooth external surface. After the application of insulation material in place, it shall be smoothly coated with insulating cement. Elbows may be insulated as above or alternatively by means of specially moulded insulation enclosures.</p> <p>Cladding</p> <p>Cladding shall be of aluminium sheet of thickness as per details given in detail Technical Specification or will be provided during detail engineering shall be machine rolled and formed to accurately fit insulation curvatures. Cladding shall be secured using self-tapping screws. Screws shall be adequate number and so located as to produce tight joints. The spacing of screws shall be as far as possible uniform and on centres not exceeding 150 mm. For outside diameters less than 230 mm, spacing of screws shall be on centres not exceeding 100 mm. adequate number of screws shall be provided for fixing the cladding and be so placed in such locations, as to produce a smooth cladding finish without bellying. Insulated elbows having insulated diameters less than 330 mm shall be provided with preformed smooth aluminium elbow jackets. Wherever possible, all joints should be lapped a minimum of 50 mm with joints facing downwards and so placed that they are obscured from normal points of vision. All the joints in the cladding shall be made with suitable provisions for expansions. All butt joints such as those at piping tees shall be made using rolled seams. In addition, to prevent galvanic corrosion, suitable action/procedure to be implemented.</p>			
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13.01.05	<p>Valves and Fittings</p> <p>All valves and fittings (above valve size of 2 inches) installed in the pipelines shall also be applied with insulation and furnished with suitably shaped boxes so as to facilitate easy dismantling of the fittings. The insulation thickness for valves, valve fittings etc., shall be same as that used on the line on which they are installed. All voids shall be properly filled up with insulating material and as per the directions of the Employer.</p>		
13.02.00	<p>Protection of Equipment during Insulation Applications</p> <p>All equipment and structures shall be suitably protected from damage while applying insulation after completion of insulation. All equipment and structures shall be thoroughly cleaned and remove insulating materials which might have fallen on them.</p>		
14.00.00	<p>CODE REQUIREMENTS</p> <p>The erection requirements and procedures to be followed during the installation of the equipment shall be in accordance with the relevant Indian Electricity Rules & Codes, ASME codes and accepted good practices, the Employer's Drawings and other applicable Indian recognised codes and laws and regulations of the Government of India.</p>		
15.00.00	<p>ELECTRICAL SAFETY REGULATIONS</p>		
15.01.00	<p>In no circumstances will the Contractor interfere with fuses and electrical equipment belonging to the other Contractor or Employer.</p>		
15.02.00	<p>Before the Contractor connects any electrical appliances to any plug or socket belonging to the other Contractor or Employer, he shall:</p> <ul style="list-style-type: none"> (a) Satisfy the Employer that the appliance is in good working condition. (b) Inform the Employer of the maximum current rating, voltage and phase of the appliances. (c) Obtain permission of the Employer detailing the socket to which the appliances may be connected. <p style="padding-left: 40px;">The Employer will not grant permission to connect until he is satisfied that</p> <ul style="list-style-type: none"> (d) The appliance is in good condition and is fitted with suitable plug. (e) The appliance is fitted with a suitable cable having two earth conductors, one of which shall be an earthened metal sheath surrounding the cores. 		
15.03.00	<p>No electric cable in use by the other Contractor/Employer will be disturbed without permission. No weight of any description will be imposed on any such cable and ladder or similar equipment will rest against or to be attached with it.</p>		
15.04.00	<p>No repair work shall be carried out on any live equipment. The equipment must be declared safe by the Employer and a permit to work issued before any work is carried out.</p>		
15.05.00	<p>The Contractor shall employ the necessary number of qualified full time electricians to maintain his temporary electrical installation.</p>		
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16.00.00	REMOVAL OF MATERIAL No material brought to the Site shall be removed from the Site by the Contractor and/or his Sub-Contractors without the prior written approval of the Employer.		
17.00.00	INSPECTION, TESTING AND INSPECTION CERTIFICATES The provisions of the clause entitled Inspection, Testing and Inspection Certificates given in Part - C of the Technical Specification, shall also be applicable to the erection portion of the Works. The Employer shall have the right to re-inspect any equipment though previously inspected and approved by him at the Contractor's works, before and after the same are erected at Site. If by the above inspection, the Employer rejects any equipment, the Contractor shall make good for such rejections either by replacement or modification/ repairs as may be necessary to the satisfaction of the Employer. Such replacements will also include the replacements or re-execution of such of those works of other Contractors and/or agencies, which might have got damaged or affected by the replacements or re-work done to the Contractor's work.		
18.00.00	ACCESS TO SITE AND WORKS ON SITE		
18.01.00	Suitable access to site and permission to work at the Site shall be accorded to the Contractor by the Employer in reasonable time.		
18.02.00	In the execution of the Works, no person other than the Contractor or his duly appointed representative, Sub-Contractor and workmen, shall be allowed to do work on the Site, except by the special permission, in writing by the Employer or his representative.		
19.00.00	CONTRACTOR'S SITE OFFICE ESTABLISHMENT The Contractor shall establish an Office at the Site and keep posted an authorised representative for the purpose of the Contract. Any written order or instruction of the Employer or his duly authorised representative, shall be communicated to the said authorised resident representative of the Contractor and the same shall be deemed to have been communicated to the Contractor at his legal address.		
20.00.00	CO-OPERATION WITH OTHER CONTRACTORS		
20.01.00	Employer, who may be performing other works on behalf of the Employer and the workmen who may be employed by the Employer and doing work in the vicinity of the works under the Contract. The Contractor shall also arrange to perform his work as to minimise, to the maximum extent possible, interference with the work of other Contracts and their workmen. Any injury or damage that may be sustained by the employees of the other Contractors and the Employer, due to the Contractor's work shall promptly be made good at his own expense. The Employer shall determine the resolution of any difference or conflict that may arise between the Contractor and other Contractors or between the Contractor and the workmen of the Employer in regard to their work. If the work of the Contractor is delayed because of the any acts of omission of another Contractor, the Contractor shall have no claim against the Employer on that account other than an extension of time for completing his works. Employer shall have full access to visit the contractor's site at any time for inspection and surveillance checks.		
20.02.00	The Employer/Client shall be notified promptly by the Contractor of any defects in the other Contractor's works that could affect the Contractor's Works. The Employer shall determine the corrective measures if any, required to rectify this situation after inspection of the works and such decisions by the Employer shall be binding on the Contractor.		
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21.00.00	<p>DISCIPLINE OF WORKMEN</p> <p>The Contractor shall adhere to the disciplinary procedure set by the Employer in respect of his employees and workmen at Site. The Employer shall be at liberty to object to the presence of any representative or employee of the Contractor at the Site, if in the opinion of the Employer such employee has misconducted himself or is incompetent, negligent or otherwise undesirable then the Contractor shall remove such a person objected to and provide in his place a competent replacement.</p>			
22.00.00	<p>CONTRACTOR'S FIELD OPERATION</p>			
22.01.00	<p>The Contractor shall keep the Employer informed in advance regarding his field activity plans and schedules for carrying out each part of the works. Any review of such plan or schedule or method of work by the Employer shall not relieve the Contractor of any of his responsibilities towards the field activities. Such reviews shall also not be considered as an assumption of any risk or liability by the Employer or any of his representatives and no claim of the Contractor will be entertained because of the failure or inefficiency of any such plan or schedule or method of work reviewed. The Contractor shall be solely responsible for the safety, adequacy and efficiency of plant and equipment and his erection methods.</p>			
22.02.00	<p>The Contractor shall have the complete responsibility for the conditions of the Work-Site including the safety of all persons employed by him or his Sub-Contractor and all the properties under his custody during the performance of the work. This requirement shall apply continuously till the completion of the Contract and shall not be limited to normal working hours. The construction review by the Employer is not intended to include review of Contractor's safety measures in, on or near the Work-Site, and their adequacy or otherwise.</p>			
23.00.00	<p>PHOTOGRAPHS AND PROGRESS REPORT</p>			
23.01.00	<p>The Contractor shall furnish three (3) prints each to the Employer of progress photographs of the work done at Site. Photographs shall be taken as and when indicated by the Employer or his representative. Photographs shall be adequate in size and number to indicate various stages of erection. Each photograph shall contain the date, the name of the Contractor and the title of the photograph.</p>			
23.02.00	<p>The above photographs shall accompany the monthly progress report detailing out the progress achieved on all erection activities as compared to the schedules. The report shall also indicate the reasons for the variance between the scheduled and actual progress and the action proposed for corrective measures, wherever necessary.</p>			
23.03.00	<p>The Contractor shall submit the progress of work in CD/DVD (2 copies) quarterly highlighting the progress and constraints at site.</p>			
24.00.00	<p>MAN-POWER REPORT</p>			
24.01.00	<p>The Contractor shall submit to the Employer, on the first day of every month, a man hour schedule for the month, detailing the man hours scheduled for the month, skill-wise and area-wise.</p>			
24.02.00	<p>The Contractor shall also submit to the Employer on the first day of every month, a man power report of the previous month detailing the number of persons scheduled to have been employed and actually employed, skill- wise and the areas of employment of such labour.</p>			
25.00.00	<p>PROTECTION OF WORK</p> <p>The Contractor shall have total responsibility for protecting his works till it is finally taken over by the Employer. No claim will be entertained by the Employer or the representative of the</p>			
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	<p>Employer for any damage or loss to the Contractor's works and the Contractor shall be responsible for complete restoration of the damaged works to original conditions to comply with the specification and drawings. Should any such damage to the Contractor's Works occur because of other party not being under his supervision or control, the Contractor shall make his claim directly with the party concerned. If disagreement or conflict or dispute develops between the Contractor and the other party or parties concerned regarding the responsibility for damage to the Contractor's Works the same shall be resolved as per the provisions of the as specified at clause no 20.00.00- of this chapter entitled "Co-operation with other Contractors." The Contractor shall not cause any delay in the repair of such damaged Works because of any delay in the resolution of such disputes. The Contractor shall proceed to repair the Work immediately and no cause thereof will be assigned pending resolution of such disputes.</p> <p>26.00.00 EMPLOYMENT OF LABOUR</p> <p>26.01.00 In addition to all local laws and regulations pertaining to the employment of labour to be complied with by the Contractor pursuant to GCC, the Contractor will be expected to employ on the work only his regular skilled employees with experience of the particular work. No female labour shall be employed after darkness. No person below the age of eighteen years shall be employed.</p> <p>26.02.00 All travelling expenses including provisions of all necessary transport to and from Site, lodging allowances and other payments to the Contractor's employees shall be the sole responsibility of the Contractor.</p> <p>26.03.00 The hours of work on the Site shall be decided by the Employer and the Contractor shall adhere to it. Working hours will normally be eight (8) hours per day - Monday through Saturday.</p> <p>26.04.00 Contractor's employees shall wear identification badges while on work at Site.</p> <p>26.05.00 In case the Employer becomes liable to pay any wages or dues to the labour or any Government agency under any of the provisions of the Minimum Wages Act, Workmen Compensation Act, Contract Labour Regulation Abolition Act or any other law due to act of omission of the Contractor, the Employer may make such payments and shall recover the same from the Contractor's Bills.</p> <p>27.00.00 NOT USED</p> <p>28.00.00 FACILITIES TO BE PROVIDED BY THE CONTRACTOR</p> <p>28.01.00 Contractor's site office Establishment</p> <p>The Contractor shall establish a site office at the site and keep posted an authorized representative for the purpose of the contract, pursuant to GCC.</p> <p>28.02.00 Tools, tackles and scaffoldings</p> <p>The Contractor shall provide all the construction equipments, tools, tackles and scaffoldings required for pre-assembly, installation, testing, commissioning and conducting Guarantee tests of the equipments covered under the Contract. He shall submit a list of all such materials to the Employer before the commencement of pre-assembly at Site. These tools and tackles shall not be removed from the Site without the written permission of the Employer. The Contractor shall arrange Dozer, Hydra, Cranes, Trailer, etc. for the purpose of fabrication, erection and commissioning.</p>		
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28.03.00	Testing Equipment and Facilities: The contractor shall provide the necessary testing, equipment and facilities.		
28.04.00	Site laboratory for civil works: Contractor shall provide and maintain a site laboratory for the testing of construction material under the direction and general supervision of employer.		
28.05.00	First-Aid		
28.05.01	The Contractor shall provide necessary first-aid facilities for all his employees, representatives and workmen working at the Site. Enough number of Contractor's personnel shall be trained in administering first-aid.		
28.05.02	The Employer will provide the Contractor, in case of any emergency, the services of an ambulance for transportation to the nearest hospital.		
28.06.00	Cleanliness		
28.06.01	The Contractor shall be responsible for keeping the entire area allotted to him clean and free from rubbish, debris etc. during the period of Contract. The Contractor shall employ enough number of special personnel to thoroughly clean his work-area at least once in a day. All such rubbish and scrap material shall be stacked or disposed in a place to be identified by the Employer. Materials and stores shall be so arranged to permit easy cleaning of the area. In areas where equipment might drip oil and cause damage to the floor surface, a suitable protective cover of a flame resistant, oil proof sheet shall be provided to protect the floor from such damage.		
28.06.02	Similarly the labour colony, the offices and the residential areas of the Contractor's employees and workmen shall be kept clean and neat to the entire satisfaction of the Employer. Proper sanitary arrangements shall be provided by the Contractor, in the work-areas, office and residential areas of the Contractor.		
28.07.00	The Contractor shall provide one (1) no. multi-utility vehicle (min. 6 seater) for facilitating movement of Employer's official of the Project, within as well as outside the plant premises. All expenses towards operation and maintenance including provision of drivers, fuel etc. associated with the vehicles shall be borne by the bidder from the date of site office opening till the completion of trial operation of the last unit.		
28.08.00	Electricity Refer to construction power, as envisaged in volume-III, Part A, Sec VI of Technical specification.		
28.09.00	Water Contractor shall make all arrangements himself for the supply of construction water as well as potable water for labour and other personnel at the worksite/colony. However, drawl of construction/potable water from bore-well shall be permitted if found suitable. Any statutory clearance required shall be obtained by the contractor. Assistance, if required shall be provided by the owner.		
29.00.00	LINES AND GRADES All the Works shall be performed to the lines, grades and elevations indicated on the drawings. The Contractor shall be responsible to locate and layout the Works. Basic horizontal and vertical control points will be established and marked by the Employer at Site at suitable points. These points shall be used as datum for the works under the Contract.		
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	<p>The Contractor shall inform the Employer well in advance of the times and places at which he wishes to do work in the area allotted to him so that suitable datum points may be established and checked by the Employer to enable the Contractor to proceed with his works. Any work done without being properly located may be removed and/or dismantled by the Employer at Contractor's expense.</p> <p>30.00.00 FIRE PROTECTION</p> <p>30.01.00 The work procedures that are to be used during the erection shall be those which minimise fire hazards to the extent practicable. Combustible materials, combustible waste and rubbish shall be collected and removed from the Site at least once each day. Fuels, oils and volatile or flammable materials shall be stored away from the construction and equipment and materials storage areas in safe containers. Untreated canvas, paper, plastic or other flammable flexible materials shall not at all be used at Site for any other purpose unless otherwise specified. If any such materials are received with the equipment at the Site, the same shall be removed and replaced with acceptable material before moving into the construction or storage area.</p> <p>30.02.00 Similarly corrugated paper fabricated cartons etc. will not be permitted in the construction area either for storage or for handling of materials. All such materials used shall be of water proof and flame resistant type. All the other materials such as working drawings, plans etc. which are combustible but are essential for the works to be executed shall be protected against combustion resulting from welding sparks, cutting flames and other similar fire sources.</p> <p>30.03.00 All the Contractor's supervisory personnel and sufficient number of workers shall be trained for fire-fighting and shall be assigned specific fire protection duties. Enough of such trained personnel must be available at the Site during the entire period of the Contract.</p> <p>30.04.00 The Contractor shall provide enough fire protection equipment of the types and number for the warehouses, office, temporary structures, labour colony area etc. Access to such fire protection equipment, shall be easy and kept open at all time.</p> <p>31.00.00 SECURITY</p> <p>The Contractor shall have total responsibility for all equipment and materials in his custody stores, loose, semi-assembled and/or erected by him at Site. The Contractor shall make suitable security arrangements including employment of security personnel to ensure the protection of all materials, equipment and works from theft, fire, pilferage and any other damages and loss. All materials of the Contractor shall enter and leave the Employer Site only with the written permission of the Employer in the prescribed manner.</p> <p>32.00.00 CONTRACTOR'S AREA LIMITS</p> <p>The Employer will mark-out the boundary limits of access roads, parking spaces, storage and construction areas for the Contractor and the Contractor shall not trespass the areas not so marked out for him. The Contractor shall be responsible to ensure that none of his personnel move out of the areas marked out for his operations. In case of such a need for the Contractor's personnel to work out of the areas marked out for him the same shall be done only with the written permission of the Employer.</p> <p>33.00.00 CONTRACTOR'S CO-OPERATION WITH THE EMPLOYER</p> <p>In case where the performance of the erection work by the Contractor affects the operation of the system facilities of the Employer, such erection work of the Contractor shall be scheduled to be performed only in the manner stipulated by the Employer and the same shall be acceptable at all times to the Contractor. The Employer may impose such restrictions on</p>		
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	<p>the facilities provided to the Contractor such as electricity, etc. as he may think fit in the interest of the Employer and the Contractor shall strictly adhere to such restrictions and co-operate with the Employer. It will be the responsibility of the Contractor to provide all necessary temporary instrumentation and other measuring devices required during start-up and operation of the equipment systems which are erected by him. The Contractor shall also be responsible for flushing and initial filling of all the oil and lubricants required for the equipment furnished and installed by him, so as to make such equipment ready for operation. The Contractor shall be responsible for supplying such flushing oil and other lubricants unless otherwise specified elsewhere in documents and specifications.</p>			
34.00.00	PRE-COMMISSIONING AND COMMISSIONING ACTIVITIES			
34.01.00	GENERAL			
34.01.01	<p>The Contractor upon completion of installation of equipments and systems, shall conduct pre-commissioning and commissioning activities, to make the equipment/systems ready for safe, reliable and efficient operation on sustained basis. All pre-commissioning/ commissioning activities considered essential for such readiness of the equipment/systems including those mutually agreed and included in the Contractor's quality assurance programme as well as those indicated in clauses elsewhere in the technical specifications shall be performed by the contractor.</p>			
34.01.02	<p>The pre-commissioning and commissioning activities including Guarantee/ demonstration/acceptability tests, checks and trial operations of the equipment/ systems furnished and installed by the contractor shall be the responsibility of the Contractor as detailed in relevant clauses in Technical Specification. The Contractor shall provide, in addition, test instruments, calibrating devices etc. and labour required for successful performance of these operations. If it is anticipated that the above test may prolong for a long time, the Contractor's workmen required for the above test shall always be present at site during such operations.</p>			
34.01.03	<p>The following activities shall be carried out by the contractor, at least eight (8) month prior to schedule date of synchronization of 1st Genset.</p> <p>(a.) The contractor shall furnish the organization chart of his operation and commissioning engineers for the acceptance of employer. Adequate number of operation and commissioning engineers shall be deployed by the contractor to effectively meet the requirement of round the clock operation in shifts also, till the plant is taken over by the employer.</p> <p>(b.) The contractor shall submit the bio-data containing the details of experience of his operation and commissioning engineers for the acceptance of employer.</p> <p>(c.) The contractor shall furnish the deployment schedule of his operation and commissioning engineers for the acceptance of the employer.</p> <p>(d.) Apart from above, contractor shall ensure deployment of sufficient skilled/semi-skilled/unskilled manpower during pre-commissioning and commissioning activities.</p>			
34.01.04	<p>It shall be the responsibility of the Contractor to provide all necessary temporary instrumentation and other measuring devices required during start-up and initial operation of the equipment/systems which are installed by him.</p>			
34.01.05	<p>The Contractor shall also be responsible for flushing and initial filling of all oils and lubricants required for the equipment furnished and installed by him so as to make such equipment ready for operation. The Contractor shall be responsible for supplying such flushing oil and other lubricants unless otherwise specified elsewhere in these specifications and documents.</p>			
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<p>34.02.00</p> <p>34.02.01</p> <p>34.02.02</p> <p>34.02.03</p> <p>34.02.04</p> <p>34.02.05</p>	<p>COMMISSIONING DOCUMENTATION</p> <p>The contractor shall submit the commissioning documentation, comprising of Standard checklists, pre-commissioning procedures, testing schedules, commissioning schedules and commissioning networks for various equipment/ systems covered under the contract, for the approval of employer.</p> <p>Standard checklist, as the name suggests, shall be a fairly general documents, containing the list of all checks required to be carried out for similar and repetitive type of equipment to ensure consistent and thorough checking. An indicative list of such equipment is enclosed as Annexure I.</p> <p>The testing schedule is a document, designed for safe and systematic commissioning of individual equipment/sub-system (for example Boiler Feed Pump, condensate pump, compressor etc) Commissioning schedule is a document envisaged for commissioning of a system (for example feed system, Condensate system, Compressed Air system, Fire water system, Unit commissioning etc). The testing/Commissioning schedule shall have a standard format in order to maintain consistency of presentation, content and reporting. A brief write up on the contents of the Testing Schedule/Commissioning Schedule is enclosed as Annexure-II.</p> <p>The contractor shall submit the list of commissioning documentation to be submitted by him, alongwith their submission schedule for various equipment/systems covered under the contract, with in 6 (six) month from the date of award of contract, for the acceptance of employer.</p> <p>The Contractor shall submit the commissioning documentation, for various equipment/covered under the contract, for the approval of employer, at least nine (9) months before the scheduled date of commissioning of the equipment/systems.</p>			
<p>34.03.00</p> <p>34.03.01</p> <p>34.03.02</p> <p>34.03.03</p> <p>34.03.04</p> <p>34.03.05</p> <p>34.03.06</p>	<p>COMMISSIONING ACTIVITIES</p> <p>Upon completion of pre-commissioning activities/tests, the contractor shall initiate commissioning of facilities. During commissioning the Contractor shall carry out system checking and reliability trials on various parts of the facilities.</p> <p>Contractor shall carry out the checks/tests at site to prove to the Employer that each equipment of the supply complies with requirements stipulated and is installed in accordance with requirements specified.</p> <p>Before the plant is put into initial operation the Contractor shall be required to conduct test to demonstrate to the Employer that each item of the plant is capable of correctly performing the functions for which it was specified and its performance, parameters etc. are as per the specified/approved values. These tests may be conducted concurrently with those required under commissioning sequence.</p> <p>The Contractor shall also demonstrate the performance of all C&I equipment, the tests on main equipment of prior to that as the case may be.</p> <p>Other tests shall be conducted, if required by the Employer, to establish that the plant equipment are in accordance with requirements of the specifications.</p> <p>The Contractor shall conduct all the commissioning tests and undertake commissioning activities pertaining to all other auxiliaries and equipments including all electrical and C&I equipment/systems not specifically brought out above but are within the scope of work and facilities being supplied and installed by the Contractor and follow the guidelines indicated above or elsewhere in these technical specifications.</p>			
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34.05.00	Initial Operation Upon completion of system checking/Tests as above and as a part of commissioning of facilities, complete plant/facilities shall be put on initial operation as stipulated in General Technical Requirements.			
35.00.00	MATERIALS HANDLING AND STORAGE			
35.01.00	All the equipments furnished under the Contract and arriving at Site shall be promptly received, unloaded and transported and stored in the storage spaces by the Contractor.			
35.02.00	Contractor shall be responsible for examining all the shipment and notify the Employer immediately of any damage, shortage, discrepancy etc. for the purpose of Employer's information only. The Contractor shall submit to the Employer every week a report detailing all the receipts during the week. However, the Contractor shall be solely responsible for any shortages or damage in transit, handling and / or in storage and erection of the equipment at Site. Any demurrage, wharfage and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor.			
35.03.00	The Contractor shall maintain an accurate and exhaustive record detailing out the list of all equipment received by him for the purpose of erection and keep such record open for the inspection of the Employer.			
35.04.00	All equipment shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings, etc. shall be used for unloading and/or handling of the equipment without the specific written permission of the Employer. The equipment stored shall be properly protected to prevent damage either to the equipment or to the floor where they are stored. The equipment from the store shall be moved to the actual location at the appropriate time so as to avoid damage of such equipment at Site.			
35.05.00	All electrical panels, controls gear, motors and such other devices shall be properly dried by heating before they are installed and energised. Motor bearings, slip rings, commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected. Heavy rotating parts in assembled conditions shall be periodically rotated to prevent corrosion due to prolonged storage.			
35.06.00	All the electrical equipment such as motors, generators/alternators, etc. shall be tested for insulation resistance at least once in three months from the date of receipt till the date of commissioning and a record of such measured insulation values maintained by the Contractor. Such records shall be open for inspection by the Employer.			
35.07.00	The Contractor shall ensure that all the packing materials and protection devices used for the various equipments during transit and storage are removed before the equipment are installed.			
35.08.00	The consumables and other supplies likely to deteriorate due to storage must be thoroughly protected and stored in a suitable manner to prevent damage or deterioration in quality by storage.			
35.09.00	All the materials stored in the open or dusty location must be covered with suitable weatherproof and flame-proof covering material wherever applicable.			
35.10.00	If the materials belonging to the Contractor are stored in areas other than those earmarked for him, the Employer will have the right to get it moved to the area earmarked for the Contractor at the Contractor's cost.			
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35.11.00	The Contractor shall be responsible for making suitable indoor storage facilities to store all equipment which require indoor storage. Normally, all the electrical equipments such as motors, control gear, generators, exciters and consumables like electrodes, lubricants etc. shall be stored in the closed storage space. The Employer, in addition, may direct the Contractor to move certain other materials, which in his opinion will require indoor storage, to indoor storage areas which the Contractor shall strictly comply with.			
36.00.00	CONSTRUCTION MANAGEMENT			
36.01.00	The field activities of the Contractors working at Site, will be coordinated by the Employer and the Employer decision shall be final in resolving any disputes or conflicts between the Contractor and other Contractors and tradesmen of the Employer regarding scheduling and co- ordination of work. Such decision by the Employer shall not be a cause for extra compensation or extension of time for the Contractor.			
36.02.00	The Employer shall hold weekly meetings of all the Contractors working at Site, at a time and place to be designated by the Employer. The Contractor shall attend such meetings and take notes of discussions during the meeting and the decisions of the Employer and shall strictly adhere to those decisions in performing his Works. In addition to the above weekly meeting, the Employer may call for other meeting either with individual Contractors or with selected number of Contractors and in such a case the Contractor if called, will also attend such meetings.			
36.03.00	Time is the essence of the Contract and the Contractor shall be responsible for performance of his works in accordance with the specified construction schedule. If at any time, the Contractor is falling behind the schedule, he shall take necessary action to make good for such delays by increasing his work force or by working overtime or otherwise accelerate the progress of the work to comply with the schedule and shall communicate such actions in writing to the Employer, satisfying that his action will compensate for the delay. The Contractor shall not be allowed any extra compensation for such action.			
36.04.00	The Employer shall however not be responsible for provision of additional labour and/or materials or supply or any other services to the Contractor except for the co-ordination work between various Contractors as set out earlier.			
36.05.00	<p>Site management during construction phase till handing over of plant</p> <p>Bidder shall ensure that the plant site within the plant boundary is managed in a coordinated and professional way all through the construction phase till handing over of plant, ensuring safe, easy & unhindered working conditions and a healthy & hygienic working environment at site. He shall ensure the following measures at site while executing the project.</p> <ul style="list-style-type: none">a) Bidder shall finalize and submit the complete road layout plan along with priority and completion schedule immediately after the award for review by the Employer .He shall ensure that the roads are promptly repaired and maintained against any damages due to movement of traffic/heavy trailers & cranes etc providing motorable access at all times.b) The plant site is fully secured against unauthorized access.c) Proper housekeeping by systematic and proper disposal of wastes (from dismantling of pile tops, concrete works etc), packing & insulation wastes, steel scrap, cable wastes etc generated during construction / erection works. Suitable disposal sites for each of above shall be identified in the layout and at site in the beginning of the project itself. It shall be ensured that all agencies engaged by the bidder follow the discipline to dispose off of earth spoils and wastes at the designated places. Preferably once in a week suitable time slot will be identified for housekeeping by all agencies and suitable instructions shall be issued in this regard. Bidder may engage a separate agency or identify a gang for collection of wastes and disposal to			
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	<p>designated places. Suitable arrangement / tie-up will also be made for periodic disposal of wastes/ scrap from the designated places.</p> <p>d) All fabrication areas shall be suitably hard crusted to provide a water free and proper working platforms. Suitable sheds preferably pre engineered structures to be provided for paint shops, fabrication workshops etc for ensuring all weather work conditions for onsite structural works. For the main plant and auxiliary buildings bidder should preferably plan the works in such a way that structural fabrication is done in suppliers' offsite works / workshops and onsite fabrication works are avoided / kept minimum.</p> <p>e) Suitable onsite maintenance workshop for day to day breakdown maintenance heavy plant and equipment like batching plants, cranes, earth moving equipment, welding equipment etc. The workshop shall have stock of frequently needed spares and suitable repair facilities with experienced technicians/mechanics. A central test laboratory equipped with test equipment for routine tests like tests on soil, concrete, bricks, aggregates, welds etc with experienced staff shall be established at the start of the project itself.</p> <p>f) All office and covered store buildings of the bidder and its agencies shall be of prefab/ pre-engineered / porta cabin construction. Shabby semi finished constructions in brickwork/ GI / asbestos roof etc shall not be permitted.</p> <p>g) First aid facilities and amenities like rest rooms, suitable pre engineered toilets (separate for men and women), drinking water fountains/tanks, canteen, crèche for women workers shall be planned and established at the beginning of the project itself. These facilities shall be distributed near by plant area to enable easy access by the construction workers and staff and shall be marked on the plant layout.</p> <p>h) Proper lighting of all construction / erection areas. Bidder shall erect adequate number of high lighting masts in main plant, offsite, office and store areas for lighting during night. DG sets of adequate capacity shall be provided for emergency backup. The street lighting along the roads shall also be prioritized along with road construction. The construction power ring main shall be planned and erected immediately after the award.</p> <p>i) Well planned and coordinated storage and movement of plant, equipment and construction materials. System wise / agency wise storage / laydown areas shall be planned and marked on the plant layout at the beginning itself. Bidder shall ensure that all its agencies comply to the areas allocated to them and follow the designated storage and movement plans. Adequate covered storage shall be constructed for storage of critical equipments like switchgears, MCCs, insulation etc.</p> <p>j) Proper access control for construction workers, staff and visitors. Bidder shall ensure that suitable electronic based gate pass system is in place from start of project itself to keep record and track of all workers, staff and visitors entering/exiting the plant premises shift wise on daily basis.</p> <p>k) Compliance to all safety requirements as specified in this document. Bidders shall establish a safety centre at the start of the project itself. It shall have a 24X7 manned safety control room in addition to a permanent safety equipment display room, separate training / lecture hall with AV facilities for safety training, store room with adequate stock of specified safety equipment, a first aid room and other amenities. Bidder shall install eight (8) Nos. CCTV cameras at all strategic locations in the plant area which shall be linked to the safety control room.</p> <p>l) Compliance to all environment and other conditions stipulated by the concerned statutory authorities while according clearance / NOC (No objection certificate) to the project. Bidder shall ensure adequate sprinkling of water by deploying water tankers to prevent the fugitive dust nuisance during construction.</p> <p>m) Development of suitable landscape & green belt areas and rainwater harvesting within the plant premises. Bidder shall plan to develop the landscape & green belt areas and rainwater harvesting from the start of the project itself. The landscape and rainwater harvesting plan shall be finalized immediately after award of work and suitable work plan with priority and schedule shall also be finalized thereafter. Top</p>			
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	<p>soil before excavation shall be suitably preserved and stacked for landscape and green belt development.</p> <p>n) Provision of adequate shelters, water supply, sanitation and lighting in construction workers and staff camps. No camps for workers and staff shall be permitted within the plant premises and Bidder shall make separate arrangement outside the plant premises for locating and development of camps for construction workers and staff. The designated areas shall be suitably developed with infrastructure like roads, drains, water supply and sewerage and shall be free from water logging. Suitable low cost shelters will be provided for the workers. Complete area shall be secured by fencing and shall be provided adequate area lighting. Suitable waste disposal, shopping and recreation facilities will be developed in these camps.</p> <p>Bidder shall ensure that due importance is given to site management as discussed above and a detailed work plan considering the above aspects is finalized immediately after the award. A senior level executive shall be identified who shall be responsible for implementation of the work plan. Suitable format for progress reporting on site management plan shall be developed and made part of the project progress report. The progress on implementation of above work plan shall be reviewed along with project progress in the monthly project review meetings with Employer. In case the progress on site management plan is unsatisfactory, Employer may withhold up to 1% of the monthly running bill (for civil and site erection works) till such time the required progress is demonstrated. Incase in the opinion of Employer, bidder's actions on site management aspects is not adequate, Employer may get the relevant work executed through a separate agency and deduct the expenses incurred from Bidder's bill along with overheads @10 %.</p>		
37.00.00	FIELD OFFICE RECORDS <p>The Contractor shall maintain at his Site Office up-to- date copies of all drawings, specifications and other Contract Documents and any other supplementary data complete with all the latest revisions thereto. The Contractor shall also maintain in addition the continuous record of all changes to the above Contract Documents, drawings, specifications, supplementary data, etc. effected at the field and on completion of his total assignment under the Contract shall incorporate all such changes on the drawings and other Engineering data to indicate as installed conditions of the equipment furnished and erected under the Contract. Such drawings and Engineering data shall be submitted to the Employer in required number of copies.</p>		
38.00.00	CONTRACTOR'S MATERIALS BROUGHT ON TO SITE		
38.01.00	<p>The Contractor shall bring to Site all equipment, components, parts, materials, including construction equipment, tools and tackles for the purpose of the Works under intimation to the Employer. All such goods shall, from the time of their being brought vest in the Employer, but may be used for the purpose of the Works only and shall not on any account be removed or taken away by the Contractor without the written permission of the Employer. The Contractor shall nevertheless be solely liable and responsible for any loss or destruction thereof and damage thereto.</p>		
38.02.00	<p>The Employer shall have a lien on such goods for any sum or sums which may at any time be due or owing to him by the Contractor, under, in respect of or by reasons of the Contract. After giving a fifteen (15) days notice in writing of his intention to do so, the Employer shall be at liberty to sell and dispose off any such goods, in such manner as he shall think fit including public auction or private treaty and to apply the proceeds in or towards the satisfaction of such sum or sums due as aforesaid.</p>		
38.03.00	<p>After the completion of the Works, the Contractor shall remove from the Site under the direction of the Employer the materials such as construction equipment, erection tools and tackles, scaffolding etc. with the written permission of the Employer. If the Contractor fails to</p>		
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	<p>This insurance shall be in such a form to protect the Contractor against all claims for injuries, disability, disease and death to members of public including the Employer's men and damage to the property of other arising from the use of motor vehicles during on or off the Site operations, irrespective of the Ownership of such vehicles. The liability covered shall be as herein indicated :</p> <table><tr><td>Fatal Injury</td><td>:</td><td>Rs.100,000 each person</td></tr><tr><td></td><td>:</td><td>Rs.200,000 each occurrence</td></tr><tr><td>Property Damage</td><td>:</td><td>Rs.100,000 each occurrence</td></tr></table>				Fatal Injury	:	Rs.100,000 each person		:	Rs.200,000 each occurrence	Property Damage	:	Rs.100,000 each occurrence
Fatal Injury	:	Rs.100,000 each person											
	:	Rs.200,000 each occurrence											
Property Damage	:	Rs.100,000 each occurrence											
41.04.00	Comprehensive General Liability Insurance												
41.04.01	<p>The insurance shall protect the Contractor against all claims arising from injuries, disabilities, disease or death of members of public or damage to property of others, due to any act or omission on the part of the Contractor, his agents, his employees, his representatives and Sub-Contractors or from riots, strikes and civil commotion. This insurance shall also cover all the liabilities of the Contractor arising out of the Clause entitled "Defence of Suits" in Section General Conditions of Contract (GCC).</p>												
41.04.02	<p>The hazards to be covered will pertain to all the Works and areas where the Contractor, his Sub-Contractors, his agents and his employees have to perform work pursuant to the Contract.</p>												
41.05.00	<p>The above are only illustrative list of insurance covers normally required and it will be the responsibility of the Contractor to maintain all necessary insurance coverage to the extent both in time and amount to take care of all his liabilities either direct or indirect, in pursuance of the Contract.</p>												
42.00.00	UNFAVORABLE WORKING CONDITIONS												
	<p>The Contractor shall confine all his field operations to those works which can be performed without subjecting the equipment and materials to adverse effects during inclement weather conditions, like monsoon, storms, etc. and during other unfavorable construction conditions. No field activities shall be performed by the Contractor under conditions which might adversely affect the quality and efficiency thereof, unless special precautions or measures are taken by the Contractor in a proper and satisfactory manner in the performance of such Works and with the concurrence of the Employer. Such unfavorable construction conditions will in no way relieve the Contractor of his responsibility to perform the Works as per the schedule.</p>												
43.00.00	PROTECTION OF MONUMENTS AND REFERENCE POINTS												
	<p>The Contractor shall ensure that any finds such as relic, antiquity, coins, fossils, etc. which he may come across during the course of performance of his Works either during excavation or elsewhere, are properly protected and handed over to the Employer. Similarly the Contractor shall ensure that the bench marks, reference points, etc., which are marked either with the help of Employer or by the Employer shall not be disturbed in any way during the performance of his Works. If, any work is to be preformed which disturb such reference, the same shall be done only after these are transferred to other suitable locations under the direction of the Employer. The Contractor shall provide all necessary materials and assistance for such relocation of reference points etc.</p>												
44.00.00	WORK & SAFETY REGULATIONS												
44.01.00	General												
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	<div><div>i)</div><div>The contractor shall comply with all the requirements of "The Building and Other Construction Workers (Regulation of Employment & Conditions of Service) Act," 1996 and its Central Rule 1998 / State Rules and any other statutory requirements as applicable.</div></div> <div><div>ii)</div><div>The Contractor shall follow NTPC Safety Rules as issued from time to time with respect to safety in construction & erection.</div></div> <div><div>iii)</div><div>The contractor shall have the approved Safety, Health and Environment (SHE) Policy in respect of Safety and health of Building Workers and it shall be circulated widely and displayed at conspicuous place in Hindi and local language understood by the majority of the workers. A copy of the safety policy should be submitted to Engineer in charge.</div></div> <div><div>iv)</div><div>The contractor shall submit the safety plan comprising of methods to implement the Safety Policy/ Rules, Risk assessment and ensuring Safety at work areas, Safety audits, inspections and its compliance, Supervision and responsibility to ensure Safety at various levels, Safety training to employees, review of Safety and accident analysis, ensure Health and Safety Procedures to prevent accidents to Engineer I/c for approval as per the format of Safety plan as annexed at Annexure - III.</div></div> <div><div>v)</div><div>The Contractors shall ensure proper safety of all the workmen, materials, plant and equipment belonging to him or to the Employer or to others, working at the Site.</div></div> <div><div>vi)</div><div>All equipments used in construction and erection by the contractor shall meet BIS / International Standards and where such standards do not exist, the Contractor shall ensure these to be absolutely safe. All equipments shall be strictly operated and maintained by the contractor in accordance with manufacturer's operation manual. The contractor should also follow Guidelines / Rules of the Employer in this regard.</div></div> <div><div>vii)</div><div>The Contractors shall provide suitable latest Personal Protective Equipments of prescribed standard to all their employees and workmen according to the need. The Engineer I/c shall have the right to examine these safety equipments to determine their suitability, reliability, acceptability and adaptability. The contractor should also ensure these before their use at worksite.</div></div> <div><div>viii)</div><div>The Contractor shall provide safe working conditions to all workmen and employees at his workplace including safe means of access, railings, stairs, and ladders, scaffolding, work platforms, toe boards etc. The scaffoldings shall be erected under the control and supervision of an experienced and competent person. For erection of scaffolds, access, work platforms etc. shall be good and the contractor shall use standard quality of material.</div></div> <div><div>ix)</div><div>The Contractor shall follow and comply with all the Safety Rules, standards, code of practices of NTPC and relevant provisions of applicable laws pertaining to the safety of workmen, employees, plant and equipment as may be prescribed from time to time without any protest or contest or reservation. In case of any unconformity between statutory requirement and the Safety Rules of the Employer referred above, the latter shall be binding on the Contractor unless the statutory provisions are more stringent. As and when required he can refer / obtain copy of NTPC safety documents as stated above.</div></div> <div><div>x)</div><div>The contractor shall have his own arrangements with nearby hospitals for shifting and treatment of sick and injured.</div></div>			
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	<p>The medical examination of the workers employed in hazardous areas shall be conducted as per Rule 223 of The Building and Other Construction Worker (Regulation of Employment and Condition of Service) Central Rule 1998, their health records shall be maintained accordingly and to be submitted to Engineer I/c when asked for. If any worker found suffering from occupational health hazard, the worker should be shifted to suitable place of working and properly treated under intimation to Engineer I/c. The medical fitness certificate to be submitted to Engineer (I/c).</p> <p>xi) First Aid boxes equipped with requisite articles as specified in the Rule 231 of The Building and Other Construction Worker (Regulation of Employment and Condition of Service) Central Rule 1998 shall be provided at construction sites for the use of workers. Training has to be provided on first aid to workmen & office bearers working at site.</p> <p>44.01.01 Emergency Action Plan</p> <p>The contractor shall prepare an emergency action plan approved by his competent authority to handle any emergency occurred during construction work. Regular mock drills shall be organized to practice this emergency plan. The Emergency Action Plan should be widely circulated to all the employees and suitable infrastructure shall be provided to handle the emergencies.</p> <p>44.01.02 Scaffolding</p> <p>The contractor shall take all precautions to prevent any accidental collapse of scaffolding or fall of persons from scaffolding. The contractor should ensure that scaffolding are designed by a competent person and its erection and repairs should be done under the expert supervision. The scaffolding shall meet the required strength and other requirements for the purpose for which the scaffold is erected. The material used for scaffold should conform to the BIS / International standards.</p> <p>44.01.03 Opening</p> <p>The contractor shall ensure that there is no opening in any working platform/any floor of the building, which may cause fall of workers or material. When ever an opening on a platform/any floor of the building is unavoidable, the opening should be suitably fenced and necessary measures for protection against falling objects or building workers from such platform are taken by providing suitable safety nets, safety belts or other similar means.</p> <p>44.01.04 Explosives</p> <p>The contractor shall take all precautions while handling, using, storing or transporting of all explosives. Before usage of any explosive necessary warning / danger signals be erected at conspicuous places to warn the workers and general public. The contractor should strictly ensure that all measures and precautions required to be complied for use, handling, storing or transportation of explosives under the rules framed under the Explosives Act, 1884.</p> <p>44.02.00 Fencing of Machinery</p> <p>The contractor shall provide suitable fencing or guard to all dangerous and moving parts of machinery.</p> <p>The contractor shall not allow any of the employees to clean, lubricate, repair, adjust or examine during machinery in motion, which may cause injury to the person.</p> <p>44.03.00 Carrying of Excessive Weight by a Worker</p>		
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44.04.00	<p>The worker shall not be allowed to lift by hand or carry over his head, back or shoulder more than the maximum limit set by the prescribed rules for the construction Workers.</p>				
	<p>Dangerous and Harmful Gases / Equipment</p> <p>The contractor shall ensure that the workers are not exposed to any harmful gases during any construction activity including excavation, tunneling, confined spaces etc.</p> <p>The contractor should not allow any worker to go into the confined space unless it is certified by Engineer (I/c) to be safe and fit for the entry to such work place. Proper record and work permits should be followed to carry out such works.</p>				
44.05.00	<p>Overhead Protection</p> <p>The contractor shall ensure that any area exposed to risk of falling materials, articles or objects is roped off or cordoned off or otherwise suitably guarded from inadvertent entry of any person.</p> <p>Wherever there is a possibility of falling of any material, equipment or construction workers while working at heights, a suitable and adequate safety net should be provided. The safety net should be in accordance with BIS Standards.</p>				
	44.06.00	<p>Working at Heights</p> <p>All working platforms, ways and other places of construction work shall be free from accumulations of debris or any other material causing obstructions and tripping.</p> <p>Wherever workers are exposed to the hazard of falling into water, the contractor shall provide adequate equipment for saving the employees from drowning and rescuing from such hazards. The contractor shall provide boat or launch equipped with sufficient number of life buoys, life jackets etc. manned with trained personnel at the site of such work.</p> <p>Every opening at elevation from ground level through which a building worker, vehicle, material equipment etc. may fall at a construction work shall be covered and/or guarded suitably by the contractor to prevent such falls.</p> <p>Wherever the workers are exposed to the hazards of falling from height, the contractor shall provide full harness safety belts fitted with fall arresting systems to all the employees working at higher elevations and life line of 8 mm diameter wire rope with turn buckles for anchoring the safety belts while working or moving at higher elevations. Safety nets shall also be provided for saving them from fall from heights and such equipment should be in accordance with BIS standards.</p> <p>Wherever there is a possibility of falling of any material, equipment or construction workers while working at heights, a suitable and adequate safety net should be provided. The safety net should be in accordance with BIS Standards.</p> <p>The contractor shall provide standard prefabricated ladders on the columns where the workers are required to use them as an access for higher elevations till permanent staircase is provided. The workers shall be provided with safety belts fitted with suitable fall arresting system (Fall arrestors) for climbing/getting down through ladders to prevent fall from height.</p>			
44.07.00		<p>Handling of Hazardous Chemicals</p> <p>The Contractor will notify well in advance to the Engineer I/c of his intention to bring to the Site any container filled with liquid or gaseous fuel or explosive or petroleum substance or such chemicals which may involve hazards. NTPC shall have the right to prescribe the</p>			
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	<p>conditions, under which such container is to be stored, handled and used during the performance of the works and the Contract shall strictly adhere to and comply with such instructions. The Engineer I/c shall have the right at his sole discretion to inspect any such container or such construction plant / equipment for which material in the container is required to be used and if in his opinion, its use is not safe, he may forbid its use. No claim due to such prohibition shall be entertained by NTPC and NTPC shall not entertain any claim of the Contractor towards additional safety provisions / conditions to be provided for / constructed.</p> <p>Further, any such decision of the Engineer I/c shall not, in any way, absolve the Contractor of his responsibilities and in case, use of such a container or entry thereof into the Site area is forbidden by NTPC, the Contractor shall use alternative methods with the approval of the NTPC without any cost implication to the NTPC or extension of work schedule.</p> <p>Where it is necessary to provide and / or store petroleum products or petroleum mixtures and explosives, the Contractor shall be responsible for carrying-out such provision and / or storage in accordance with the rules and regulations laid down in Petroleum Act 1934, Explosives Act 1948, and Petroleum and Carbide of Calcium Manual published by the Chief Inspector of Explosives of India. All such storage shall have prior approval of the Engineer I/c. In case any approvals are necessary from the Chief Inspector (Explosives) or any statutory authorities, the Contractor shall be responsible for obtaining the same.</p> <p>The Contractor shall be fully responsible for the safe storage of his and his Sub-contractor's radio-active sources in accordance with BARC/DAE (Bhabha Atomic Research Centre/ Department of Atomic Energy, Govt. of India) Rules and other applicable provisions. All precautionary measures stipulated by BARC/DAE in connection with use, the contractor would take storage and handling of such material.</p> <p>The contractor shall provide suitable personal protective equipments to the workers who are handling the hazardous and corrosive substances including alkalis and acids.</p> <p>As a precautionary measure the contractor should keep the bottles filled with distilled water in cupboard / Boxes near work place for emergency eye wash by worker exposed to such hazardous chemicals.</p>			
44.08.00	<p>Eye Protection</p> <p>The contractor shall provide suitable personal protective equipment to his workmen depending upon the nature of hazards and ensure their usage by the workers engaged in operations like welding, cutting, chipping, grinding or similar operations which may cause injuries to his eyes.</p>			
44.09.00	<p>Excavation</p> <p>The contractor shall take all necessary measures during excavation to prevent the hazards of falling or sliding material or article from any bank or side of such excavation which is more than one and a half meter above his footing by providing adequate piling, shoring, bracing etc. against such bank or sides.</p> <p>Adequate and suitable warning signs shall be put up at conspicuous places at the excavation work to prevent any persons or vehicles falling into the excavation trench. No worker should be allowed to work where he may be stuck or endangered by excavation machinery or collapse of excavations or trenches.</p>			
44.10.00	<p>Electrical Hazards</p>			
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	<p>The contractor should ensure that all electrical installations at the construction work comply with the requirements of latest electricity acts / rules.</p> <p>The contractor shall take all adequate measures to prevent any worker from coming into physical contact with any electrical equipment or apparatus, machines or live electrical circuits which may cause electrical hazards during the construction work. The contractor shall provide the sufficient ELCBs / RCCBs for all the portable equipments, electrical switchboards, distribution panels etc. to prevent electrical shocks.</p> <p>The contractor should ensure use of single / double insulated hand tools or low voltage i.e., 110 volts hand tools.</p> <p>The contractor should also ensure that all temporary electrical installations at the construction works are provided with earth leakage circuit breakers.</p> <p>44.11.00 Vehicular Traffic</p> <p>The contractor should employ vehicle drivers who hold a valid driving license under the Motor Vehicles Act, 1988.</p> <p>44.12.00 Lifting Appliances, Tools & Tackles, Lifting Gear and Pressure Plant & Equipment etc.</p> <p>The contractor shall ensure all the lifting appliances, tools & tackles including cranes etc., lifting gear including fixed or movable and any plant or gear, hoists, Pressure Plant and equipment etc. are in good condition and shall be examined by competent person and only certified shall be used at sites. Periodical Examination and the tests for all lifting / hoisting equipment & tackles shall be carried out. A register of such examinations and tests shall be properly maintained by the Contractor and will be promptly produced as and when desired by the Engineer I/c or by the person authorized by him.</p> <p>44.13.00 Excessive Noise, Vibration</p> <p>The contractor shall take adequate measures to protect the workers against the harmful effect of excessive noise or vibration. The noise should not exceed the limits prescribed under the concerned rules, Noise Pollution (Regulation and Control) Rules, 2000.</p> <p>44.14.00 Electrical Installations</p> <p>44.14.01 The Contractor shall not interfere or disturb electric fuses, wiring and other electrical equipment belonging to the Employer or other contractors under any circumstances, whatsoever, unless expressly permitted in writing by the Engineer I/c to handle such fuses, wiring or electrical equipment.</p> <p>Before the Contractor connects any electrical appliances to any plug or socket belonging to the other contractor or the NTPC, he shall</p> <ol style="list-style-type: none"> Satisfy the Engineer I/C that the appliance is in good working condition; Inform the Engineer I/C of the maximum current rating, voltage and phases of the appliances; Obtain permission of the Engineer I/C detailing the sockets to which the appliances may be connected. <p>The Engineer I/C will not grant permission to connect until he is satisfied that:</p> <p>The appliance is in good condition and is fitted with suitable plug; having earth connection with the body.</p>		
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	<p>Wherever armored / metallic sheathed multi core cable is used, the same armored / sheathed should be connected to earth.</p> <p>iv) No repair work shall be carried out on any live equipment. The Engineer I/c must declare the equipment safe and a permit to work shall be issued by the NTPC / contractor as the case may be to carry out any repair / maintenance work. While working on electric lines / equipments whether live or dead, suitable type and sufficient quantity of tools will have to be provided by the contractor to electricians / workmen / Officers.</p> <p>v) The contractor shall employ necessary number of qualified, full time Electricians / Electrical Supervisors to maintain his temporary electrical installation.</p> <p>The installations are provided with suitable ELCBs and RCCBs wherever required.</p>			
44.15.00	Safety Organisation			
44.15.01	The contractor shall employ full time safety officer(s) as per requirement stipulated in NTPC Safety Rules, exclusively to supervise safety aspects of the equipments and workmen, who will coordinate with the NTPC Safety Officer. Further requirement of safety officers, if any, shall be guided by Rule 209 of The Building and Other Construction Worker (Regulation of Employment and Conditions of Service) Central Rule 1998. In case the work is being carried out through subcontractor, the employees / workmen of the subcontractor shall also be considered as the contractor's employees/workmen for the above purpose.			
44.15.02	The name and address of such Safety Officer of the Contractor will be promptly informed in writing to the EIC with a copy to the Project Safety Officer before he starts work or immediately after any change of the incumbent is made during currency of the Contract.			
44.16.00	Reporting of Accident and Investigation <p>In case any accident occurs during the construction / erection or other associated activities undertaken by the Contractor thereby causing any near miss, minor or major or fatal injury to his employees due to any reason, whatsoever, it shall be the responsibility of the Contractor to promptly inform the same to the Engineer I/C, NTPC Safety Officer with a copy to NTPC Head of Project in the prescribed form and also to all the authorities envisaged under the applicable laws.</p>			
44.17.00	Right to stop Work			
44.17.01	The Engineer I/C shall have the right at his sole discretion to stop the work, if in his opinion the work is being carried out in such a way that it may cause accidents and endanger the safety of the persons and / or property, and / or equipments. In such cases, the contractor shall be informed in writing about the nature of hazards and possible injury / accident and he shall comply to remove shortcomings promptly. The Contractor after stopping the specific work can, if felt necessary appeal against the order of stoppage of work to the Project Manager within 3 days of such stoppage of work and decision of the Project Manager in this respect shall be conclusive and binding on the Contractor.			
44.17.02	The Contractor shall not be entitled for any damages / compensation for stoppage of work, {Sub-Clause XVIII (I)} due to safety reasons and the period of such stoppage of work shall not be taken as an extension of time for Completion of the Facilities and will not be the ground for waiver of levy of liquidated damages.			
44.18.00	Fire Protection			
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44.19.00	<p>The contractor shall provide sufficient fire extinguishers at place /s of work. The fire extinguishers shall be properly maintained as per relevant BIS Standards. The employees shall be trained to operate the fire extinguishers / equipment.</p> <p>Penalties</p> <p>I If the Contractor fails in providing safe working environment as per the Safety Rules of NTPC or continues the work even after being instructed to stop the work by the Engineer I/C as provided in Clause XVIII (1) above, the Contractor shall be penalized at the rate of Rs. 25,000/- per day or part thereof till the instructions are complied with and so certified by the Engineer I/C. However, in case of accident, the provisions contained in Sub-Clause XX (II) below shall also apply in addition to the penalties mentioned in this sub-clause.</p> <p>II If the Contractor does not take all safety precautions and / or fails to comply with the Safety Rules as prescribed by the Employer or under the applicable law for the safety of the plant and equipment and for the safety of personnel and the contractor does not prevent hazardous conditions which cause injury to this own employees or employees of other contractors, or NTPC's employees or any other person who are at the Site or adjacent thereto, the Contractor shall be responsible for payment of penalty to NTPC as per the following schedule:-</p> <p>a) Fatal injury or accident causing death:</p> <p>Penalty @10% of contract value or Rs. 5,00,000/- per person, which ever is less.</p> <p>b) Major injuries or accident causing 25% or more permanent disablement to workmen or employees:</p> <p>Penalty @2.5% of contract value or Rs. 1,00,000/- per person which ever is less</p> <p>Permanent disablement shall have the same meaning as indicated in The Workmen's Compensation Act' 1923. The penalty mentioned above shall be in addition to the compensation payable to the workmen / employees under the relevant provisions of the Workmen's Compensation Act' 1923 and rules framed there under or any other applicable laws as applicable from time to time.</p> <p>III If any contractor worker found working without using the safety equipment like safety helmet, safety shoes, safety belts, etc. or without anchoring the safety belts while working at height the Engineer I/c / Safety Officer of NTPC shall have the right to penalize the contractor for Rs. 200/- per person per day and such worker shall be sent out of the workplace immediately and shall not be allowed to work on that day. Engineer I/c / Safety Officer of NTPC will also issue a notice in this regard to the contractor.</p> <p>IV If two or more fatal accidents occur at same NTPC site under the control of contractor during the period of contract and he has</p> <p>(1) not complied with keeping adequate PPEs in stock or</p> <p>(2) defaulted in providing PPEs to his workmen</p> <p>(3) not followed statutory requirements / NTPC safety rules</p>		
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	<div><div>(4) been issued warning notice/s by NTPC head of the project on non observance of safety norms</div><div>(5) not provided safety training to all his workmen, the contractor can be debarred from getting tender documents in NTPC for two years from the date of last accident.</div></div> <p>The safety performance will also be one of the overriding criteria for evaluation of overall performance of the contractors by NTPC. The contractor shall submit the accident data including fatal / non-fatal accidents for the last 3 years where he has undertaken the construction activities Projects-wise along with the tender documents. This will also be considered for evolution of tender documents. If the information given by the contractor found incorrect, his contract will be liable to be terminated.</p>			
44.20.00	The Contractor will make available minimum quantity of all safety equipments and safety PPEs of required specifications as per suggestive list included bidding documents as a part of "List of minimum T & P". Further Contractor will ensure availability of additional requirement for individual worker and safety equipment as per site requirement during execution of the contract till its completion.			
44.21.00	<p>The Contractor shall abide by the following during Construction and Erection activities:</p> <div><div>I. Chain pulley block shall not be used for loads more than 2 (Two) tonne.</div><div>II. Hydra shall not be used for material transport.</div><div>III. Cage shall necessarily be provided to Monkey ladders of height more than 4 m.</div><div>IV. Fencing shall be provided to all Electrical Distribution boards and transformers etc.</div></div>			
44.21.00	<p>Award</p> <p>If the Contractor's performance on safety front is found satisfactory i.e. without any fatal/reportable accident in the year of consideration; he may be considered for suitable award "ACCIDENT FREE SAFETY MERITORIOUS AWARD" as per scheme of the employer.</p>			
45.00.00	<p>FOREIGN PERSONNEL</p>			
45.01.00	The Contractor shall submit to the Employer data on all personnel he proposes to bring into India from abroad for the performance of the Works under the Contract, at least sixty (60) days prior to their departure to India. Such data will include for each person the name, his present address, his assignment and responsibility in connection with the works, and a short resume of his qualification, experience etc. in relation to the work to be performed by him.			
45.02.00	Any person unsuitable and unacceptable to the Employer shall not be brought to India. Any person brought to India, if found unsuitable or unacceptable by the Employer, the Contractor shall within a reasonable time make alternate arrangements for providing a suitable replacement and repatriation of such unsuitable personnel.			
45.03.00	No person brought to India for the purposes of the works shall be repatriated without the consent of the Employer in writing, based on a written request from the Contractor for such repatriation giving reasons for such an action to the Employer. The Employer may give permission for such repatriation provided he is satisfied that the progress of work will not suffer due to such repatriation.			
45.04.00	The cost of passports, visas and all other travel expenses to and from India, incurred by the Contractor shall be to his account. The Employer will not provide any residential accommodation and/or furniture for any of the Contractor's personnel including foreign personnel and Contractor shall make his own arrangements for such facilities in the area allotted at Site, to him by the Employer for that purpose.			
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45.05.00	The Contractor and his expatriate personnel shall respect all Indian Acts, Laws, rules and regulations and shall not in any way interfere with Indian political and religious affairs and shall conform to any other rules and regulations which the Government of India and the Employer may establish from time to time, on them. The Contractor's expatriate personnel shall work and live in close co-operation and coordination with their co-workers and the community and shall not engage themselves in any other employment neither part-time or full-time nor shall they take part in any local politics.		
45.06.00	The Employer shall assist the Contractor, to the extent possible, in obtaining necessary permits to travel to India and back, by issue of necessary certificates and other information needed by the Government agencies.		
46.00.00	FOUNDATION DRESSING & GROUTING FOR EQUIPMENT/ EQUIPMENT BASES		
46.01.00	The surfaces of foundations shall be dressed to bring the top surface of the foundations to the required level, prior to placement of equipment/equipment bases on the foundations.		
46.02.00	All the equipment/ equipment bases, shall be grouted and finished by bidder as per these specifications unless otherwise recommended by the equipment manufacturer.		
46.03.00	The concrete foundation surfaces shall be properly prepared by bidder by chipping, grinding as required to bring the top of such foundation to the required level, to provide the necessary roughness for bondage and to assure enough bearing strength.		
46.04.00	<p>Grout</p> <p>The grout for equipment foundation shall be high strength grout having a minimum characteristic compressive strength of 60 N/mm² at 28 days. The grout shall be ready mix non-shrink, chloride - free, cement based, free flowing, non-metallic grout as recommended by equipment manufacturer. The ready mix grout shall be of reputed make as approved by the Employer.</p> <p>The Grout shall have good flowability even at very low water/ grout powder ratio.</p> <p>The Grout shall have characteristics of controlled expansion to be able to occupy its original volume to fill the voids and to compensate for shrinkage. Grout shall be of pre-mix variety so that only water needs to be added before use.</p> <p>The mixing of the Grout shall conform to the recommendations of the manufacturer of the Grout.</p>		
46.05.00	Placing of Grout		
46.05.01	After the base has been prepared, its alignment and level has been checked and approved and before actually placing the grout, a low dam shall be set around the base at a distance that will permit pouring and manipulation of the grout. The height of such dam shall be at least 25mm above the bottom of the base. Suitable size and number of chains shall be introduced under the base before placing the grout, so that such chains can be moved back & forth to push the grout into every part of the space under the base.		
46.05.02	The grout shall be poured either through grout holes if provided or shall be poured at one side or at two adjacent sides to make the grout move in a solid mass under the base and out in the opposite side. Pouring shall be continued until the entire space below the base is thoroughly filled and the grout stands at least 25 mm higher all around than the bottom of the base. Enough care should be taken to avoid any air or water pockets beneath the bases.		
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46.05.03	In addition to the above, recommendations of Grout manufacturer shall also be followed.			
46.06.00	Finishing of the Edges of the Grout The poured grout should be allowed to stand undisturbed until it is well set. Immediately thereafter, the dam shall be removed and grout which extends beyond the edges of the structural or equipment base plates shall be cut off, flushed and removed. The edges of the grout shall then be pointed and finished with 1:2 cement mortar pressed firmly to bond with the body of the grout and smoothened with a tool to present a smooth vertical surface. The work shall be done in a clean and scientific manner and the adjacent floor spaces, exposed edges of the foundations, and structural steel and equipment base plates shall be thoroughly cleaned of any spillage of the grout.			
46.07.00	Checking of Equipment after Grouting After the grout is set and cured, the Contractor shall check and verify the alignment of equipments, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings, etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during such post grouting check-up and verifications. Such pre and post grout records of alignment details shall be maintained by the Contractor in a manner acceptable to the Employer.			
47.00.00	SHAFT ALIGNMENTS All the shafts of rotating equipment shall be properly aligned to those of the matching equipments to as perfect an accuracy as practicable. The equipment shall be free from excessive vibration so as to avoid overheating of bearings or other conditions which may tend to shorten the life of the equipment. The vibration level of rotating equipments measured at bearing housing shall conform to Zone A of ISO 10816. All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.			
48.00.00	DOWELLING All the motors and other equipment shall be suitably doweled after alignment of shafts with tapered machined dowels as per the direction of the Employer.			
49.00.00	CHECK OUT OF CONTROL SYSTEMS After completion of wiring, cabling furnished under separate specification and laid and terminated by the Employer, the Contractor shall check out the operation of all control systems for the equipment furnished and installed under these specifications and documents.			
50.00.00	COMMISSIONING SPARES			
50.01.00	It will be the responsibility of the Contractor to provide all commissioning spares including consumable spares required for initial operation till the Completion of Facilities. The Contractor shall furnish a list of all commissioning spares within thirty (30) days from the date of Notification of Award and such list shall be reviewed by the Employer and mutually agreed to. However, such review and agreement will not absolve the Contractor of his responsibilities to supply all commissioning spares so that initial operation do not suffer for want of commissioning spares. All commissioning spares shall be deemed to be included in the scope of the Contract at no extra cost to the Employer.			
50.02.00	These spare will be received and stored by the Contractor atleast 3 months prior to the schedule date of commencement of initial operation of the respective equipment and utilised as and when required. The unutilised spares and replaced parts, if any, at the end of			
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<p>51.00.00</p> <p>51.01.00</p> <p>51.02.00</p> <p>51.03.00</p> <p>51.04.00</p> <p>51.05.00</p> <p>51.06.00</p>	<p>successful completion of guarantee tests shall be the property of the Contractor and he will be allowed to take these parts back at his own cost with the permission of Employer.</p> <p>CABLING</p> <p>All cables shall be supported by conduits or cable tray run in air or in cable channels. These shall be installed in exposed runs parallel or perpendicular to dominant surfaces with right angle turn made of symmetrical bends or fittings. When cables are run on cable trays, they shall be clamped at a minimum intervals of 2000mm or otherwise as directed by the Employer.</p> <p>Each cable, whether power or control, shall be provided with a metallic or plastic tag of an approved type, bearing a cable reference number indicated in the cable and conduit list (prepared by the Contractor), at every 5 meter run or part thereof and at both ends of the cable adjacent to the terminations. Cable routing is to be done in such a way that cables are accessible for any maintenance and for easy identification.</p> <p>Sharp bending and kinking of cables shall be avoided. The minimum radii for PVC insulated cables 1100 V grade shall be 15 D where D is the overall diameter of the cable. Installation of other cables like high voltage, coaxial, screened, compensating, mineral insulated shall be in accordance with the cable manufacturer's recommendations. Wherever cables cross roads and water, oil, sewage or gaslines, special care should be taken for the protection of the cables in designing the cable channels.</p> <p>In each cable run some extra length shall be kept at a suitable point to enable one or two straight through joints to be made, should the cable develop fault at a later date.</p> <p>Control cable terminations shall be made in accordance with wiring diagrams, using identifying codes subject to the Employer's approval. Multicore control cable jackets shall be removed as required to train and terminate the conductors. The cable jacket shall be left on the cable, as far as possible, to the point of the first conductor branch. The insulated conductors from which the jacket is removed shall be neatly twined in bundles and terminated. The bundles shall be firmly but not tightly tied utilising plastic or nylon ties or specifically treated fungus protected cord made for this purpose. Control cable conductor insulation shall be securely and evenly cut.</p> <p>The connectors for control cables shall be covered with a transparent insulating sleeve so as to prevent accidental contact with ground or adjacent terminals and shall preferably terminate in Elmex terminals and washers. The insulating sleeve shall be fire resistant and shall be long enough to over pass the conductor insulation. All control cables shall be fanned out and connection made to terminal blocks and test equipment for proper operation before cables are corded together.</p>		
<p>52.00.00</p> <p>52.01.00</p>	<p>EQUIPMENT DELIVERY AND ERECTION</p> <p>General Requirements</p> <p>(a.) This part covers Contractor's responsibilities for packing, shipping, ware-housing and the installation of all equipment and materials furnished and installed under this specification.</p> <p>(b.) The Contractor shall submit for Employer's approval draft manual for Equipment Delivery and Erection (EDE Manual) covering detailed instructions, write up, technical data, drawings, check-lists, documentation formats for all activities after equipment manufacture upto installation of equipment. This manual shall cover general instructions for all equipment and specific instructions for individual equipment wherever required and shall include at least the following:</p>		
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CLAUSE NO.	<div>ERECTION CONDITIONS OF CONTRACT</div> <div> </div>		
52.02.00	<div> <ul style="list-style-type: none"> (1.) Instructions for packing, shipping, receiving handling, ware-housing and storage. (2.) Instructions for location and installation of equipment furnished by this specification. (3.) Installation drawings for field mounted equipment, panels, cubicles and other equipment covered under this specification. (4.) Instruction relating installation of piping/ tubing, support and routing drawings of impulse pipes/signal tubes and tube/cable trays. (5.) Check lists and quality assurance hold points. (6.) Format for all related documentation. (c.) The EDE Manual shall conform to the requirements of this specification, all applicable codes and standards, recommendations of equipment manufacturers and accepted good engineering practices and shall be subject to Employer approval during detailed engineering. (d.) The Contractor shall ensure that all work under this part shall be performed as per the requirements of this specification, Employer approved EDE Manual and drawing/documents approved by the Employer during detailed engineering. <div>Crating</div> <ul style="list-style-type: none"> (a.) All equipment and materials shall be suitably coated, wrapped, or covered and boxed or crated for moist humid tropical shipment and to prevent damage or deterioration during handling and storage at the site. (b.) Equipment shall be packed with suitable desiccants, sealed in water proof vapour-proof wrapping and packed in lumber of plywood enclosures, suitably braced, tied and skidded. Lumber enclosures shall be solid, not slatted. (c.) Desiccants shall be either silica gel or calcium sulphate, sufficiently ground to provide the required surface area and activated prior to placing in the packaging. Calcium sulphate desiccants shall be of a chemical nature to absorb moisture. In any case, the desiccant shall not be of a type that will absorb enough moisture to go into solution. Desiccants shall be packed in porous containers, strong enough to withstand handling encountered during normal shipment. Enough desiccant shall be used for the volumes enclosed in wrapping. (d.) Review by the Employer of the Contractor's proposed packaging methods shall not relieve the Contractor of responsibility for damage or deterioration to the equipment and materials specified. (e.) All accessory items shall be shipped with the equipment. ; Boxes and crates containing accessory items shall be marked so that they are identified with the main equipment. The contents of each box and crates shall be indicated by markings on the exterior. (f.) All boxes, crates, cases bundles, loose pieces, etc. shall be marked consecutively from No.1 upward throughout all shipments from a given port to completion of the order without repeating the same number. (g.) An itemized list of contents shall be enclosed inside each case and one other copy securely fastened to the outside of the case in a tin or light weight sheet metal envelope or pocket. The lists shall be plainly marked and placed in accessible </div>		
<div> GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE </div>	<div> TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC NO: CS-6401-001-2 </div>	<div> VOLUME-VII ERECTION CONDITIONS OF CONTRACT </div>	<div> PAGE 31 OF 44 </div>


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52.03.00	<p>locations to facilitate receipt and inspection. The packing list shall indicate whether shipment is partial or complete and shall incorporate the following information on each container, etc., according to its individual shipping number:</p> <p>a) Export case markings</p> <p>b) Case number</p> <p>c) Gross weight and net weight in Kilograms</p> <p>d) Dimensions in centimeters</p> <p>e) Complete description of material</p> <p>(h.) Packaging or shipping units shall be designed within the limitations of unloading facilities and the equipment which will be used for transport. Complications involved with ocean shipment and the limitations of ports, railways and roads shall be considered. It shall be the Contractor's responsibility to investigate these limitations and to provide suitable packaging to permit safe handling during transit and at the job site.</p> <p>(i.) Electrical equipment, control and instrumentation shall be protected against moisture and water damage. All external gasket surfaces and flange faces, couplings, motor pump shafts, bearing and like items shall be thoroughly cleaned and coated with rust preventive compound as specified above and protected with suitable wood, metal or other substantial type covering to ensure their full protection.</p> <p>(j.) Equipment having antifriction or sleeve bearings shall be protected by weather tight enclosures.</p> <p>(k.) Coated surfaces shall be protected against impact, abrasion, discolouration and other damage. Surfaces which are damaged shall be repaired.</p> <p>(l.) All exposed threaded parts shall be greased and protected with metallic or other substantial type protectors. All female threaded openings shall be closed with forged steel plugs. All pipings, tubing, and conduit equipment and other equipment openings shall be sealed with metallic or other rough usage covers and tapped to seal the interior of the equipment piping, tubing, or conduit.</p> <p>(m.) Provisions shall be made to ensure that water does not enter any equipment during shipment or in storage at the plant site.</p> <p>(n.) Returnable containers and special shipping devices shall be returned by the manufacturer's field representative at the Contractor's expense.</p> <p>(o.) While packaging the material, care shall be taken for the limitation from the point of view of availability of railway wagon sizes in India.</p>			
	<p>Factory Assembly</p> <p>(a.) Instrument enclosures shall be supplied and erected completely in the factory with instrument, air supply and blow down piping with necessary valves, fittings, etc. and also all electrical wiring between the instruments and the enclosure terminal blocks. Control panel and cubicles shall also be fully wired in the factory. Control panel mounted equipments are to be dismantled from the panels before shipment and individually packed for shipment. Electronic control modules of the plug-in type are to be removed from equipment racks after factory checkout are individually packed</p>			
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52.04.00	<p>for shipment. Other equipment shall be fully assembled at the factory, except for necessary shipping splits in panels.</p>			
	<p>(b.) All separately packaged accessories items and parts shall be shipped with the equipment. Containers for separately packaged items shall be marked so that they are identified with the main equipment. An itemized packing slip, indicating what is in that carton only, shall be attached to the outside and inside of each container used for packing.</p> <p>A master packing slip covering all accessories items for a given piece of equipment which are shipped in separate containers, shall be attached to one container.</p>			
	<p>Equipment Installation</p>			
	<p>(a.) General Requirements</p>			
	<p>(1.) The Contractor shall furnish all construction materials, tools and equipment and shall perform all work required for complete installation of all control and instrument equipment furnished under this specification.</p>			
	<p>(2.) Contractor shall prepare detailed installation drawings for each equipment furnished under this specification for Employer's approval. Installation of all equipment/systems furnished by this specification shall be as per Employer's approval.</p>			
	<p>(3.) Erection procedures not specified herein shall be in accordance with the recommendations of the equipment manufacturers. The procedures shall be acceptable to the Employer.</p>			
	<p>(4.) The Contractor shall coordinate his work with other suppliers where their instruments and devices are to be installed under specifications.</p>			
	<p>(b.) Installation Materials</p> <p>All materials required for installation, testing and commissioning of the equipment shall be furnished by the Contractor.</p>			
	<p>(c.) Regulatory Requirements</p> <p>All installation procedures shall confirm with the accepted good engineering practice and with all applicable governmental laws, regulations and codes.</p>			
<p>(d.) Cleaning</p> <p>All equipment shall be cleaned of all sand, dirt and other foreign materials immediately after removal from storage and before the equipment is brought inside the power plant building or to other installation sites. All piping and tubes shall be air blown.</p>				
<p>(e.) Equipment Assembly</p> <p>Equipment installed under these specifications shall be assembled if shipped unassembled. The equipment shall be dismantled and reassembled as required to perform the installation and commissioning work described in these specifications.</p>				
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	<p>(f.) Equipment Setting</p> <p>Field mounted instruments and accessories shall be bracket or sub panel mounted on the nearest suitable firm steel work or masonry. The brackets, stands, supports and other miscellaneous hardware required for mounting instruments and accessories such as receiver gauge, air set, valve manifold, purge-meter etc. shall be furnished and installed. No field mounted instruments shall be installed such that it depends for support or rigidity on the impulse piping or on electrical connection to it.</p> <p>Indicating type field mounted instruments shall be installed in such a way that centre of indicating dial shall be about 1600-1800mm from operating floor level. Non-indicating type field instruments shall be installed such that operating handle of manifold block / isolating cock comes within 1600 mm from operating floor level.</p> <p>(g.) Free-Standing Equipment</p> <p>Free-standing Cabinets shall be attached to the floor, concrete equipment bases or supporting steel as indicated on the manufacturer's drawings and the Employer's Plant Arrangement Drawings. The cabinets shall be shimmed for proper alignment before bolting them to the floor. Adjacent enclosures shall be shimmed to maintain mutually level appearance before they are attached to floor. Vibration dampening mounts shall be installed between supporting structures and panels when specified.</p> <p>(h.) Non-free Standing Equipment</p> <p>(1.) Non-free standing local enclosures and cabinets shall be mounted in accessible locations on columns, walls, or stands in locations as indicated on the Employer's Plant Arrangement Drawings. Bracket and stands shall be fabricated as required to install the local enclosures and cabinets in a workman like manner.</p> <p>(2.) Rough edges and welds on all fabricated supports shall be ground smooth. The supports shall be finished with two coats of primer and two coats of paint as specified in this part.</p> <p>(i.) Equipment Location</p> <p>(1.) All individual items of equipment not located in cabinets or on panels and racks are located approximately according to the floor elevation and the nearest building column designated by the Employer.</p> <p>(2.) Solenoid valves not located in enclosures or mounted on valves shall be mounted in easily accessible protected locations near the components with which they are associated.</p> <p>(3.) All brackets, stands, supports and other miscellaneous hardware required for mounting devices shall be furnished and installed.</p> <p>(4.) Thermometers shall be installed in the process lines and ducts as required and adjusted for ease in reading.</p> <p>(5.) Permanent temperature wells on the main steam, hot reheat and cold reheat piping shall not be installed until steam blowing has been completed. Temporary temperature wells shall be installed in the main and reheat steam piping during steam blow and discarded after completion.</p>		
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	<p>(6.) Any required adapting hardware such as pipe bushings, nipples, drilled caps and the like shall be provided for complete installation of control devices into process connections.</p> <p>For location of C&I related equipment/devices, the requirement specified elsewhere in the technical specification may be referred.</p> <p>(j.) Installation of Field Mounted Instruments and Devices</p> <p>The Contractor shall submit installation drawings for all field mounted equipment furnished under this specification for Employer's approval. These drawings shall meet the requirements of this specification, installation drawings, applicable codes and standards and recommendations of manufacturers of instruments/devices. All installation work under this specification shall be strictly as per installation drawings approved by the Employer during detailed engineering stage.</p> <p>In addition to above relevant Portion as specified elsewhere in technical specification may be referred.</p> <p>(k.) Piping Connections</p> <p>(1.) All equipment having piping connections shall be levelled, aligned and wedged in place but shall not be grouted or bolted prior to the initial fitting and alignment of connecting piping. All equipment shall, however, be grouted or bolted to its foundation prior to final bolting or welding of the connection piping.</p> <p>(2.) All flanged joints shall be checked and retightened after approximately 10 days of operation at normal operating temperature.</p> <p>(l.) Equipment Checkout</p> <p>(1.) All equipment shall be cleaned after installation. Equipment subject to pressure differentials shall be checked for leakage.</p> <p>(2.) After erection, all equipment having moving parts, having electrical apparatus, or subject to pressure differentials shall be trial-operated.</p> <p>(m.) Defects</p> <p>(1.) All defects in erection shall be corrected to the satisfaction of the Employer and the Project Manager. The dismantling and reassembly of Contractor furnished equipment to remove defective parts, replace parts, or make adjustments shall be included as a part of the work under these specifications.</p> <p>(2.) The removal of control and instrument equipment in order to allow bench calibration, if required, and the re-installation of the said equipment after calibration shall also be included as a part of the work under these specifications.</p> <p>(n.) Equipment Protection</p> <p>(1.) All equipment to be erected under these specifications shall be protected from damage of any kind from the time of contract award until commissioning of each unit.</p>			
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	<p>(2.) The equipment shall be protected during storage as described herein.</p> <p>(3.) Equipment shall be protected from weld spatter during construction.</p> <p>(4.) Suitable guards shall be provided for protection of personnel on all exposed rotating or moving machine parts. All such guards with necessary spares and accessories shall be designed for easy removal and maintenance.</p> <p>(5.) Equipment having glass components such as gauges, or equipment having other easily breakable components, shall be protected during the construction period with plywood enclosures or other suitable means. Broken, stolen, or lost components shall be replaced by the Contractor.</p> <p>(6.) Machine finished surfaces, polished surfaces, or other bare metal surfaces which are not to be painted, such as machinery shafts and couplings shall be provided temporary protection during storage and constructional periods by a coating of a suitable non-drying, oily type, rust preventive compound.</p> <p>53.00.00 WELDING - SPECIAL REQUIREMENTS</p> <p>If the manufacturer has special requirements relating to the welding procedures for welds at the terminals of the equipments to be performed under separate specifications, the requirements shall be submitted to the Project Manager in advance of commencement of erection work.</p> <p>54.00.00 DEVIATIONS DISPOSITIONING:</p> <p>Any deviation to the contract and employer approved documents shall be properly recorded in the format prescribed by NTPC. All the deviations shall be brought to the knowledge of employer's representative for suitable dispositioning.</p> <p>55.00.00 NON-DESTRUCTIVE TESTING (NDT):</p> <p>The contractor shall record results of NDTs carried out at site in the format acceptable to employer. All the radiographs & its report duly signed & correlated to the job shall be handed over to the employer. Sensitivity of all the test equipment shall be compatible to the job & acceptance norms agreed.</p> <p>56.00.00 TESTING EQUIPMENT & FACILITIES:</p> <p>Contractor shall provide the testing equipment and facilities necessary to carry out tests & inspections.</p>		
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	<p style="text-align: right;">ANNEXURE-I</p> <p style="text-align: center;">STANDARD CHECKLIST</p> <p style="text-align: center;">COMMISSIONING/TESTING ESSENTIAL PRE-REQUISITE</p> <p>1. MECHANICAL</p> <p>(A.) VALVES</p> <ul style="list-style-type: none"> (1.) MANUALLY OPERATED VALVE (2.) ELECTRICALLY OPERATED VALVE (3.) PNEUMATICALLY ACTUATED VALVE (4.) HYDRAULICALLY ACTUATED VALVE (5.) SAFETY VALVE (6.) ELECTROMATIC RELIEF VALVE (7.) BUTTERFLY VALVE (ELECTRICALLY OPERATED) (8.) BUTTERFLY VALVE (MANUALLY OPERATED) (9.) BUTTERFLY VALVE (FOUR WAY-ELECTRICAL) (10.) NON-RETURN VALVE (INCLUDING HYDRAULIC/PNEUMATIC FCNRVS) (11.) THREE WAY CONTROL VALVE (12.) RELIEF VALVE (13.) DIFFERENTIAL PRESSURE REGULATING VALVE (14.) FLOAT OPERATED VALVES <p>(B.) TANKS AND PRESSURRE VESSELS</p> <ul style="list-style-type: none"> (1.) TANKS (METAL) UPTO 20 M2 (2.) TANKS (LARGE STORAGE) (3.) PRESSURE VESSEL (BELOW 17 BARS) (4.) AIR RECEIVER <p>(C.) PUMPS</p> <ul style="list-style-type: none"> (1.) PUMP LOW PRESSURE CENTRIFUGAL (MOTOR DRIVEN) (2.) PUMP UP TO 350 HP (260 KW) (3.) PUMP SUMP INSTALLATION 			
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	<div><div>(4.) GEAR PUMP/SCREW PUMP</div><div>(D.) PIPE WORK SYSTEM</div><div><div>(1.) WATER SERVICES</div><div>(2.) OIL/FIRE RESISTANT FLUID SYSTEM</div><div>(3.) AIR SERVICES (COMPRESSOR)</div><div>(4.) HIGH PRESSURE SERVICES</div><div>(5.) CONSTANT LOAD SUPPORT</div><div>(6.) SPRING SUPPORTS</div><div>(7.) HANGERS AND OTHER SUPPORTS</div></div><div>(E.) STRAINER AND FILTER</div><div><div>(1.) STRAINER/FILTER BASKET TYPE</div><div>(2.) STRAINER ROTARY (LOW PRESSURE)</div><div>(3.) FILTER & STRAINERS CENTRIFUGAL SEPARATORS</div><div>(4.) FILTER & STRAINER Y-TYPE</div><div>(5.) FILTER & STRAINER (PLATE TYPE)</div><div>(6.) PURIFIER</div><div>(7.) FILTER-COMPRESSED AIR LINE</div></div><div>(F.) HEAT EXCHANGER</div><div><div>(1.) HEAT EXCHANGER (GENERAL)</div><div>(2.) HEAT EXCHANGER-OIL/WATER</div></div><div>(G.) FANS AND COMPRESSORS</div><div><div>(1.) FANS-NON-PRESSURE LUBRICATED</div><div>(2.) FANS-AXIAL FLOW PRESSURE LUBRICATED</div><div>(3.) COMPRESSORS-GENERAL</div><div>(4,) DAMPERS & GATES</div></div><div>(H.) CRANES AND ELEVATORS</div><div><div>(1.) AUXILIARY OVERHEAD CRANE</div><div>(2.) TRAVEL SUPPORT STRUCTURE FOR CRANE</div></div></div>			
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	<p>(3.) LONG TRAVEL & CROSS TRAVERSE MOTION OF CRANE</p> <p>(4.) MAIN AUX. HOIST MOTION (CRANE)</p> <p>(5.) ELECTRIC HOIST</p> <p>(I.) POWER TRANSMISSION</p> <p>(1.) POWER TRANSMISSION GEAR BOX</p> <p>(2.) BEARING</p> <p>(3.) FLUID COUPLINGS</p> <p>2. ELECTRICAL</p> <p>(1.) SWITCHYARD</p> <p>(2.) POWER TRANSFORMERS, LT INDOOR TRANSFORMERS, OUTDOOR TRANSFORMERS,</p> <p>(3.) BATTERY CHARGERS, DC BATTERIES, DG SETS, STATION LIGHTING, OVERHEAD LINES.</p> <p>(4.) MV BUS DUCTS</p> <p>(5.) D.C. MOTOR</p> <p>(6.) HV SQUIRREL CAGE INDUCTION MOTOR</p> <p>(7.) 415 V SQUIRREL CAGE INDUCTION MOTOR</p> <p>(8.) MOTOR OPERATED ACTUATORS</p> <p>(9.) LT SWITCHGEARS/MCC</p> <p>(I.) STANDARD CHECLISTS FOR ALL TYPES OF RELAYS USED IN SWITCHGEARS PROTECTION SYSTEM</p> <p>(II.) PT CARRIAGE AND CUBICLES</p> <p>(III.) CABLE/BUS DUCT/BUS BARS</p> <p>(IV.) CONTRACTOR MODULE</p> <p>(V.) SWITCH FUSE MODULE</p> <p>(VI.) MASTER PANEL OF LUBE OIL PANEL</p> <p>(VII.) FEEDER PANEL OF LUBE OIL PANEL</p> <p>(VIII.) SPACE HEATER AND CABLE MODULE</p> <p>(IX.) CONTROL TRANSFORMER MODULE</p> <p>(X.) HT CIRCUIT BREAKER</p>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME-VII ERECTION CONDITIONS OF CONTRACT	PAGE 39 OF 44

CLAUSE NO.	ERECTION CONDITIONS OF CONTRACT 			
	<p>(XI.) 415 V CIRCUIT BREAKER</p> <p>(10.) POWER CABLE</p> <p>(11.) CONTROL CABLE</p> <p>(12.) AUXILIARY CABLE</p> <p>(13.) D.C. CABLE</p> <p>(14.) EXPLOSION PROOF ELECTRICAL EQUIPMENT</p> <p>(15.) JUNCTION BOX</p> <p>(16.) CONTROL TRANSFORMER MODULE</p> <p>(17.) BRUSH GEAR ASSEMBLY</p> <p>(18.) AUX. CONTROL AND RELAY PANEL DESK</p> <p>(19.) INDICATING INSTRUMENT</p> <p>(20.) RECORDING INSTRUMENT</p> <p>(21.) INTEGRATING INSTRUMENT</p> <p>3. CONTROL & INSTRUMENTATION</p> <p>(A.) CONDUCTIVITY ANALYSING EQUIPMENT INCLUDING TEST PROCEDURES</p> <p>(B.) PH ANALYSER INCLUDING TEST PROCEDURE</p> <p>(C.) SILICA ANALYSER</p> <p>(D.) LEVEL SWITCH (FLOAT ACTUATED)</p> <p>(E.) LEVEL SWITCH (ELECTRODE TYPE)</p> <p>(F.) LEVEL SWITCH (DISPLACER ACTUATED)</p> <p>(G.) TRANSMITTER (FLOAT OPERATED PNEUMATIC OUTPUT) INCLUDING TESTING PROCEDURE</p> <p>(H.) LEVEL INDICATOR (FLOAT/PULLEY TYPE)</p> <p>(I.) LOCAL TEMPERATURE INDICATORS INCLUDING TEST PROCEDURE</p> <p>(J.) RESISTANCE THERMOMETER ELEMENT INCLUDING TEST PROCEDURE</p> <p>(K.) THERMOCOUPLE ELEMENT AND CONNECTING CABLE</p> <p>(L.) THERMOCOUPLE AND RESISTANCE THERMOMETER CONVERTOR/TRANSMITTER INCLUDING TEST PROCEDURES.</p>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME-VII ERECTION CONDITIONS OF CONTRACT	PAGE 40 OF 44

CLAUSE NO.	ERECTION CONDITIONS OF CONTRACT			<div>एनटीपीसी NTPC</div>
	(M.)	TEMPERATURE SWITCH/THERMOSTAT INCLUDING TEST PROCEDURES		
	(N.)	COLD JUNCTION BOXES		
	(O.)	ZENER BARRIER		
	(P.)	O ₂ ANALYSER		
	(Q.)	O ₂ IN HYDROGEN INCLUDING TEST PROCEDURES		
	(R.)	PRESSURE AND VACUUM GAUGE		
	(S.)	PRESSURE AND VACUUM SWITCH INCLUDING TEST PROCEDURE		
	(T.)	DIFFERENTIAL PRESSURE TRANSMITTER INCLUDING TEST PROCEDURE		
	(U.)	DIFFERENTIAL PRESSURE SWITCH INCLUDING TEST PROCEDURE.		
	(V.)	FLOW INDICATOR (VARIABLE AREA)		
	(W.)	ORIFICE PLATE		
	(X.)	TURBINE FLOW TRANSMITTER		
	(I.)	FLOW SWITCH		
	(II.)	WEIR		
	(III.)	NOZZLE		
	(IV.)	FLOW INDICATOR (PNEUMATIC INPUT) INCLUDING TEST PROCEDURE		
	(V.)	FLOW INTEGRATOR (PNEUMATIC INPUT) INCLUDING TESTPROCEDURE		
	(VI.)	FLOW INDICATOR (FLOAT OPERATED) INCLUDING TEST PROCEDURE		
	(VII.)	VENTURI (FLUID)		
	(VIII.)	FLOW SWITCH (MAGNETIC TYPE)		
	(IX.)	AVERAGING INLET		
	(X.)	LIMIT SWITCHES		
	(Y.)	TURBINE SUPERVISORY MEASURING SYSTEM		
	(Z.)	POSITION MEASUREMENT AND INDICATION INCLUDING TEST PROCEDURES		
	(AA.)	TACHOMETER		
	(BB.)	VIBRATION MEASUREMENT		
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME-VII ERECTION CONDITIONS OF CONTRACT	PAGE 41 OF 44

CLAUSE NO.	<div>ERECTION CONDITIONS OF CONTRACT</div> <div>  </div>		
	<div> <p>(CC.) DIGITAL INDICATOR</p> <p>(DD.) MOVING COIL INDICATOR INCLUDING TEST PROCEDURE</p> <p>(EE.) RECORDER INCLUDING TEST PROCEDURE</p> <p>(FF.) FLAME SCANNER</p> <p>(GG.) ELECTRICAL AUTO MANUAL CONTROL STATION</p> <p>(HH.) PUSH BUTTON MODULE</p> <p>(II.) ALARM ANNUNCIATOR EQUIPMENT INCLUDING TEST PRO</p> <p>(JJ.) TEST PROCEDURE FOR ELECTRONIC MODULES OF DDCMIS</p> <p>KK.) THERMO CONTROL VALVE</p> <p>(LL.) TEST PROCEDURE FOR ADJUSTMENT OF MODULATING CONTROLLER - PID TERMS</p> <p>(MM.) TEST PROCEDURE INDICATING CONTROLLER-ELECTRICAL INPUT AND PNEUMATIC OUTPUT</p> </div> <p>Note: The items which are not part of this specification may be considered as not applicable.</p>		
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME-VII ERECTION CONDITIONS OF CONTRACT	PAGE 42 OF 44

CLAUSE NO.	<div>ERECTION CONDITIONS OF CONTRACT</div> <div>  </div>			
	<div>ANNEXURE-II</div> <div> <p align="center">BRIEF WRITE UP ON THE CONTENTS OF TESTING SCHEDULE / COMMISSIONING SCHEDULE</p> </div> <div> <p>Testing Schedules should be designed to ensure that the plant area, equipment or apparatus are tested and commissioned and will operate as per the employer's specifications and good engineering practices.</p> </div> <div> <p>Testing Schedule/Commissioning Schedule is required to be of a standard format in order to maintain consistency of presentation, content and reporting.</p> </div> <div> <p>Testing Schedule/Commissioning Schedule should contain the following sections to make the document a self contained one:</p> </div> <div> <ol style="list-style-type: none"> 1. Plant Details/Design data 2. Testing Objective/Proposals 3. State of the Plant <ol style="list-style-type: none"> a) Erection Status with respect to Mech. Elect and C&I b) Availability of the services required c) Safety requirements as per Manufacturer's 4. Test method including completion/acceptance criteria 5. Results 6. Appendix <ol style="list-style-type: none"> a) Testing Programme b) Mech./Elect./C&I -Plant item completing list c) List of Drawing/documents required for carrying out the testing. </div>			
GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC NO: CS-6401-001-2	VOLUME-VII ERECTION CONDITIONS OF CONTRACT	PAGE 43 OF 44

CLAUSE NO.	<div>ERECTION CONDITIONS OF CONTRACT</div> <div>  </div>		
	<div>ANNEXURE - III</div> <div>SAFETY PLAN</div> <div> <ol style="list-style-type: none"> 01. Safety Policy of the Contractor to be enclosed 02. When was the Safety Policy last reviewed 03. Details of implementation procedure / methods to implement Safety Policy / Safety Rules 04. Name, Qualification, experience of Safety Officer 05. Review of Accidents Analysis Method, Methods to ensure Safety and Health 06. Unit executive responsible to ensure Safety at various levels in work area 07. List of employees trained in safety employed before execution of the job. Give the details of training 08. Safety Training Targets, Schedules, methods adopting to providing safety training to all employees 09. Details of checklist for different jobs / work and responsible person to ensure compliance (copy of checklist to be enclosed) 10. Regular Safety Inspection Methods and Periodicity and list of members to be enclosed. 11. Risk Assessment, Safety Audit by Professional Agencies, Periodicity 12. Implementation of Recommendations of Audit / Inspections. Procedures for implementation and follow up 13. Provision for treatment of injured persons at work site 14. Review of overall safety by top Management and Periodicity 15. System for Implementation of Statutory legislations 16. Issue of PPEs to employees, Periodicity / stock on hand etc <div> <p>Signature Head of the Organisation with date & stamp</p> </div> </div>		
<div>GREAT NICOBAR ISLAND GAS ENGINE POWER PROJECT (108 MW ±5 MW) EPC PACKAGE</div>	<div> TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC NO: CS-6401-001-2 </div>	<div> VOLUME-VII ERECTION CONDITIONS OF CONTRACT </div>	<div> PAGE 44 OF 44 </div>